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ABSTRACT

This practical guide for educators discusses the concept of electronic collaboration and how educators can begin to utilize this emerging tool. The guide reports on what electronic collaboration is--a process that connects individuals electronically via the Internet to work together on an intellectual, academic, or practical endeavor--and explains why educators should participate in the use of this powerful tool that brings teachers together out of isolation, provides time for reflection, and provides other coincidental benefits. This guide is designed for teachers, school leaders, curriculum experts, technical specialists, and anyone else interested in this emerging technology. One can be involved in electronic collaboration in many ways, from participating, to setting up a collaborative environment, to moderating a discussion. This guide tells those interested in the technology about: ways to collaborate electronically (chapter 2), designing and implementing a collaborative project, and becoming an effective online moderator (chapter 3), and choosing appropriate tools to support a collaboration (chapter 4). A list of resources to help educators explore the possibilities of electronic collaboration on their own and to assist them in getting the latest information about tools and collaborative projects is included (chapter 5). The book provides information about many forms of electronic collaboration, but focuses on discussion groups, as they are the most common online activity. Contains an index. (VWC)

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Electronic Collaboration:
A Practical Guide for Educators

A joint production of:

LAB

Northeast and Islands Regional Educational
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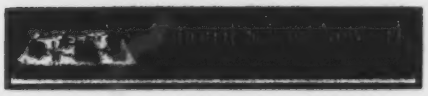

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1. Keying into the Concept: About Electronic Collaboration

This is a time when educators are facing many new challenges. They are being asked to change the way they teach, to adapt curriculum to meet new curriculum standards, to change assessment practices, and to integrate technology into their teaching and learning.

Some educators are finding that collaboration among teachers around issues raised by these challenges can be a powerful means to help them examine and improve their classroom practice. They know that such collaboration is important, because it allows them to reflect on their teaching, develop curriculum, share resources, and get advice about issues of common interest. Unfortunately, the organization and culture of American schools do not provide enough consistent support for educators to work with their colleagues on issues of teaching and learning. Many teachers are discovering that telecommunications is a potentially powerful tool to support such collaboration. It allows them to be creative thinkers, problem solvers, risk takers, and innovators.

What is Electronic Collaboration?

Collaboration is a process by which people work together on an intellectual, academic, or practical endeavor. In the past, that has meant in person, by letter, or on the telephone.

Electronic collaboration, on the other hand, connects individuals electronically via the Internet using tools such as email, or through access to sites on the World Wide Web. This Internet-based work allows collaborators to communicate anytime, from anywhere to any place. People from different parts of a building, state, country, or continent can exchange information, collaborate on shared documents and ideas, study together, or reflect on their own practices. These activities are described in more detail in Chapter 2.

Collaborating electronically can take many different forms. Some of the more common activities include the following:

- *Discussion groups* are focused around a topic or a specific activity, goal, or project. Some groups are open-ended and unmoderated, allowing users to solicit information from each other. Other, more

structured, groups may use a moderator to guide the discussion by filtering and posing questions and/or making comments, suggestions, and connections.

- *Data collection and organization* activities use databases and search engines to organize and retrieve data. Users contribute data individually to a shared database and retrieve data from it as needed. Data can be in the form of references (such as pointers to related work and Web sites), information (such as weather conditions or whale sightings), curriculum projects, research papers, and contact information for colleagues.
- Some projects involve *sharing documents*—from simply displaying them to having several people work on them simultaneously. Collaborators can display documents online and discuss the contents via email, videoconference, or chat. They can use annotation systems to comment on shared documents and editing tools to co-edit documents online.
- *Synchronous communication* activities such as Internet "chat" and videoconferencing—differ from the other types of activities in that they happen in real time, over a short period. In text based "chat" environments participants see what the other person is typing on the screen in real time. Videoconferencing is like a conference call with pictures. These technologies allow users to discuss ideas, debate problems, and share information electronically when face-to-face interaction is desired but not possible.
- Teachers participate in *online courses or workshops* to learn something new. They are like traditional courses and workshops, but without face to face meetings. The electronic component allows people to participate whenever and from wherever they want. Such activities involve an instructor who distributes assignments, guides the conversation, and responds to participants' questions. The material for discussion, as well as the discussions themselves, can take place via a discussion group or through an integrated distance learning tool. An added benefit is that participants learn about using an electronic medium.

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Why Participate? The Power of Electronic Collaboration

I value thinking and talking about teaching and learning with colleagues. I can communicate at my convenience as much or as little as I want to or have time to. I can read what others have to say and go back to their ideas and reflect. I have ongoing discussions over a period of time with the opportunity to add to, delete, amend ideas and thoughts, and look back to what was previously shared by others and myself. A big advantage was the intimacy of the small group and the trust that developed among the members. I learned a lot, and I thought a lot.

—A second grade teacher who participated in an online math conference

Most educators are used to short-term professional development seminars and workshops that provide finite information. Electronic collaboration —because it can be done at any time, from anywhere—allows for a sustained effort where participants can propose, try out, refine, and shape ideas themselves. The potential to communicate with educators from all over the world provides a pool of resources and professional companions that teachers might not find within their own school walls. It can also provide them with a sense of belonging, a sense of identity within a larger community.

Electronic collaboration brings teachers out of isolation

Many educators would like to get together to figure out how to teach and reach students more effectively. For example, new curriculum standards require that teachers change the way they teach. Through collaboration, teachers can learn how colleagues are making those changes and reflect on their own practices.

Unfortunately, opportunities for collaboration don't always exist within a single school. Electronic collaboration allows teachers to connect to a new set of colleagues. Participants can communicate with people who share the same interests and experience the same challenges. Because it allows for the inclusion of many people, electronic collaboration promotes the exchange of a larger range of opinions and resources.

Electronic collaboration provides many more opportunities for interaction than do face-to-face collaborative activities. For example, whereas traditional workshops and courses typically use lectures or presentations to impart information, online courses allow for an extended on-topic dialogue through electronic discussion groups long after the course has ended. Although teachers return to their classrooms, no longer are they isolated

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there. Instead, they are "in this together," exploring, chatting, reviewing, researching, commiserating, and networking.

Electronic collaboration provides time for reflection

Typically, during the school day teachers are pressed for time and lack opportunities to stop and reflect on their work experiences or move beyond on-the-fly brainstorming that may happen by chance in the hallway. The asynchronous nature of electronic collaboration allows participants to contribute to the conversation when it's convenient and to reflect on what others have said before responding. In addition, having to articulate in writing professional struggles and suggestions forces writers to take time to be thoughtful and reflect carefully about new ideas and pathways.

Electronic collaboration has other coincidental benefits

Beyond providing the chance to connect to other people and time to reflect on topics of importance, electronic collaboration can have other benefits. For example, teachers who become comfortable using critical work-world skills on the computer—such as brainstorming, teamwork, and communicating well—may incorporate them into their classroom practices so that they become a natural part of their teaching style.

One of the most common uses of the Internet is gathering (or "surfing" for) information. Electronic collaboration adds a different dimension —participants don't just surf for resources on the Internet, but actively and interactively contribute to exploring innovative ideas. With electronic collaboration, the adage "two heads are better than one" could just as well be "two hundred heads are better than one." One person's provocative question can lead to many creative, exciting solutions. By sharing what they know with others, participants advance their own knowledge and the collaborative community's knowledge.

About This Guide

This guide is designed for teachers, school leaders, curriculum experts, technical specialists, and anyone else interested in this emerging technology. It is also intended to show those outside the education field—business executives, museum curators, parents, and the community at large—the value of educational electronic collaboration.

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You can be involved in electronic collaboration in many ways, from participating, to setting up a collaborative environment, to moderating a discussion. This guide tells you about:

- Ways to collaborate electronically (Chapter 2)
- Designing and implementing a collaborative project (Chapter 3)
- Becoming an effective online moderator (Chapter 3)
- Choosing appropriate tools to support a collaboration (Chapter 4)

We've also included a list of resources to help you explore the possibilities of electronic collaboration on your own and to assist you in getting the latest information about tools and collaborative projects (Chapter 5). This guide provides information about many forms of electronic collaboration, but focuses on discussion groups, as they are the most common online collaborative activity.

Educators are still in the early stages of exploring this new frontier. We offer our guidance based on the current state of this new art. The Web page addresses (called *URLs*) cited in brackets in the text throughout the guide are good resources for the most up-to-date information on electronic collaboration. Be advised, though, that URLs change frequently; you may encounter a message that says the page has moved or is no longer available.

BBN's Experience with Electronic Collaboration

BBN (now GTE Internetworking) has a long history of supporting educational collaboration on the Internet. Two current projects have particularly informed the development of this guide. Working with over 300 early telecommunications adopter school systems, BBN developed the National School Network (NSN), which is dedicated to helping educators develop new pedagogical models, share their learning, and collaborate over the 'Net to support school reform. Partnering with Brown University's Regional Educational Laboratory, the Online Collaboration for Reform project is exploring the use of communications technology to support educators who are implementing new state curriculum standards. Other projects and people that have contributed to the work reported here include TERC's TEECH (Teacher Enhancement Electronic Community Hall) project with additional input from Jack Lochhead, Billy Spitzer, and Bill Barowy, The Concord Consortium's INTEC project with additional input from Sarah Haavind and George Collison, and EDC's NCIP (National Center to Improve Practice) project with additional input from Arlene Remz, Linda Davenport, Denise Ethier, and Robert Speilvogel. Our experience with these and other projects has provided a rich foundation for the information presented herein.

What You Should Know

This guide assumes that you have a basic knowledge about computers in general and that you know how to use email. If you've never used email before, it's a good idea to look over any email application user's guide or have someone give you a guided tour. If you know how to use a Web browser (software that reads HTML files), there are many email primers on the World Wide Web, such as those at the WebTeacher [http://www.webteacher.org/macnet/indextc.html] and Inter-Links sites [http://alabanza.com/kabacoff/Inter-Links/email/email.html].

If you come across a term with which you're not familiar, check the index. It will refer you to the page where that term is defined.

2. Ways to Collaborate: Activities and Environments

In this guide we talk a lot about collaborative *environments*. We use this term to refer to the overall medium constructed to carry out a collaboration. Environments may be based on an individual tool, such as email, or on multiple tools. For example, the environment for an online workshop may use a Web site to display course materials and a discussion group for talking about course content.

As we mentioned in the previous chapter, there are a number of activities that support electronic collaboration, such as discussion groups, data collection and organization, sharing documents, online workshops, and synchronous communication. This chapter tells you more about these activities and briefly introduces some technologies you can use to build an environment to support them.

Discussion Groups

In electronic discussion groups (also known as *forums, newsgroups*, or *conferences)* teachers can converse and build relationships with their colleagues, outside consultants, subject matter experts, and professional development specialists. Such forums are being used to help create knowledge-building communities, to foster teacher reflection, to support online courses, and simply to provide a means for soliciting information and "chatting."

Discussion groups can be focused either by topic or around a specific activity (such as designing a science evaluation), goal (understanding curriculum standards), or project (developing Internet-based classroom curriculum). Groups may be limited to members or open to the public. In Web-based discussion groups, messages can include links to Web pages and can be referenced by Web pages. (In fact, when you conduct a Web search on a specific topic, the search results often include messages that are part of discussion groups.)

The purpose and organization of electronic discussion groups run the gamut from "free-wheeling" to highly structured and moderated conversations. Unmoderated groups allow participants to solicit information from each other directly. Moderated groups use a facilitator to

screen postings, keep the discussion on track, or serve as an expert on the topic under discussion.

Reasons to Use Discussion Groups to Collaborate

Some of the reasons teachers use discussion groups are to solicit information or make contact with other teachers, to talk about a particular topic, to accomplish a task, or to learn something specific (via an online course, for example). Depending on the purpose of the discussion group, its characteristics and the tools used will vary.

Soliciting Information or Making Contact

Discussions in these forums are generally short. Users post messages asking for information such as resources to support a unit on diversity. The conversation is usually not moderated and the shelf life is typically limited to a brief set of interactions. These groups may or may not be restricted to certain users.

Example

TeachNET provides resources for teachers such as curriculum sharing guides and a Let's Talk bulletin board for teachers to share ideas and solicit information from their colleagues. [http://www.teachnet.org/]

USENET newsgroups are commonly used to solicit information from members with similar interests. These discussion groups are organized around common interests, such as parenting (misc.kids), academic topics like solid earth sciences (sci.geo.geology), hobbies, etc. Newsgroup names are arranged topically and hierarchically, so that the first part of the name indicates a general category ("mainstream" categories include comp, misc, news, rec, soc, sci, and talk; the "alt" category is for topics "alternative" to the mainstream), the second part specifies a subgroup (for example, "alt.education" deals with education), and so forth. To access newsgroups, your school or Internet Service Provider must subscribe to them. You can view and post articles to those groups using a Web browser. If your organization does not offer access to newsgroups, try Reference.com [http://www.reference.com/] for access to news and mailing list archives. You can also search for newsgroups by topic at Deja News [http://www.dejanews.com/]

Conversing about a Specific Topic

While the moderation level varies in these types of discussion groups, participants focus the discussion on particular topics, such as alternative assessment, educational policymaking, or partnering with parents.

Example

The Math Forum at Swarthmore has hosted a number of different discussion groups or forums, all of which are moderated. For example, the Geometry Middle School Forum provided a framework for discussing issues pertaining to this discipline and age. In the Learning and Math Discussion Group, reference material was posted to provide a basis for discussion of the issues. The Math Forum regularly initiates new discussion groups. [http://forum.swarthmore.edu/]

Accomplishing a Task

These discussion groups are focused on a specific activity, such as designing a science evaluation. They are often moderated and more structured than the two previously described types of groups.

Example

The Empire State Partnerships (ESP) Project had as a major task the design of a Web site for providing professional development activities over the Internet for project members. The team of site developers used a discussion group as one way to allow everyone to comment on proposed Web pages for the site. [http://www.esp-artsed.org/]

Learning Something Specific

Discussion forums have been incorporated into a number of online courses as a means for providing an arena for reflection, discussing course content, and creating a knowledge building environment. These types of groups are usually time-delimited and use a moderator.

Example

Through its **International Netcourse Teacher Enhancement Coalition (INTEC)**, the Concord Consortium offers graduate-level network-based courses for educators that address the reform of mathematics and science teaching. The INTEC NetCourse combines face-to-face synchronous discussion with asynchronous moderated online discourse. [http://intec.concord.org/]

Useful Technologies

The most common way to join a discussion group is via a mailing list server, a program that allows an administrator to create a mailing list of addresses and attach the list to a single email address. When users send mail to the mailing list server address, it is distributed to all the members of the list. There are also Web-based tools that automatically archive discussion messages and allow users to sort, organize, and capture ideas so they can reflect upon their discussion later. Some other common Web-based technologies that support discussions are topic-based discussion systems, threaded discussions, integrated groupware, and shared whiteboards. See

Chapter 4 for a detailed description of these technologies and tools that support them.

Data Collection, Organization, and Sharing

Some collaborations involve gathering and sharing information and/or resources or producing large amounts of data. Examples include:

- Curriculum resources such as lesson plans, sample problems, or even primary source material books, videotapes, or software [http://www.mcrel.org/connect/plus/]
- References to articles or research papers [http://www.ipl.org/ref/RR/static/edu4000.html]
- Specific curriculum projects [http://www.gsn.org/pr/index.html]
- Contact information for colleagues in your field [http://www.classroom.net/]
- Specific curriculum-related information, such as weather conditions or whale sightings [http://www.pedagonet.com/]

Often this information is stored in a database that allows collaborators and eventually other users to re-organize the information in a variety of ways. A well-organized database allows users to find specific resources and pieces of information easily.

A number of online interactive classroom-based curriculum projects use the Web to facilitate the gathering of data from classrooms across geographically dispersed areas.

	Examples
Sometimes information about educators themselves can be the data that is collected. The **Classroom Connect** Web site maintains a database of more than 4,000 educators. Teachers can add themselves to the database and use it to find other educators by grade level, subject area, location, and/or interests. [http://www.classroom.net/classroom/teachcontact/] * * * The **Well Connected Educator** Web site has a hotlist of classroom-related Web sites with comments about the merits of the sites and how they connect to the curriculum. [http://www.techlearning.com/index2.html]	**The National School Network (NSN)** has developed a Web Site Evaluation Form that can be used by teachers, students, and community members to evaluate and categorize Web sites and Web-based curriculum offerings for their usefulness in the classroom and overall quality. This tool can be used to develop a database of valued resources by local communities of interest or by groups via the Internet. Instead of teachers "surfing the Web," here they stop and examine specific educational qualities of a site (such as examples of student work). Reviews are then posted to an online database allowing others to search for sites that meet criteria (e.g., by grade level or subject area). A discussion feature allows participants to discuss reviews and the usefulness of sites. Finally, individuals may request reviews of their Web pages by other educators, providing a unique peer-review opportunity. [http://nsn.bbn.com/webeval/site1.htm]

Useful Technologies

Some groupware packages, such as Lotus Notes or Lotus Domino, have built-in database capabilities. Web search engines such as AltaVista use the whole Web as an information database. Some sites have specific search engines that allow users to search for specific information within a site; many provide options to search the entire Internet as well. The Northeast and Islands Regional Educational Lab has a site-oriented search engine that allows users to search other lab sites as well.
[http://lists.lab.brown.edu:8080/].
See Chapter 4 for a detailed description of these technologies and tools that support them.

Sharing Documents

Another way to collaborate electronically uses the network to display documents around which collaboration is to take place. These might be a lesson plan, a workshop syllabus, an action research paper, curriculum materials, examples of student work, a technology plan, or a curriculum scope and sequence.

The purpose of sharing a document online might be to edit and develop it or simply use it as the basis of discussion. If collaborators are all contributing to the development of a document, comments or sections can be sent via email, or the document can be posted on a server, from which participants can directly download the document to their desktop computers, edit it, then email it or upload it. Downloading to edit requires that all participants have a compatible version of the software used to create the document. This method of sharing documents also requires strict version control—a way of protecting the document so that earlier versions aren't destroyed.

Example

An example of sharing documents for discussion can be found at the **Well Connected Educator (WCE)** Web site, where more than 150 K-12 educators publish stories about what strategies work, and don't work, in their classroom, school, or district. Participants in the WCE can attach documents they wish to share to their email messages. [http://www.techlearning.com/index2.html]

* * *

To see a demonstration of Web-based document sharing software, go to the **SamePage** Web site. [http://www.accentuate.com/samepage/]

Useful Technologies

Documents can be easily shared online by displaying them on a Web site. There are many tools for converting text to HTML (the language used to display documents on the Web). There are also a few programs designed to support group co-editing of documents, such as the Web-based SamePage. Annotation systems, such as Webliographer and Redline, provide a means for commenting on shared documents. Many word processing packages, such as recent versions of Microsoft Word, also include group editing tools. These documents can also be shared over the Web. See Chapter 4 for a detailed description of these tools.

Synchronous Communication

Synchronous communication—collaboration that happens in real time—is supported most commonly by online chat and videoconferencing. These types of collaboration create an exciting environment not always possible through other methods, because they take advantage of the Internet's interactive multimedia features. This interaction provides immediate feedback for participants and builds connections that can lead to deeper learning relationships.

When should you choose synchronous over asynchronous communications? In synchronous activities, participants all have access to the same

information at the same time—they can share a common experience and react immediately to information that is being presented or to each others' comments. It's a great way to kick off a collaboration when face-to-face meetings aren't feasible, so participants can "meet" each other and start to build their online community. For a long-term collaboration, consider using synchronous events at prescribed intervals to bring everyone up to date on the project. Synchronous activities are also a good way to involve experts who are available for "one-time" presentations or discussions. For more about synchronous communication see NSN's "Internet Events Cookbook: A Guide to Planning for, Participating in, and Sponsoring Internet Events." [http://nsn.bbn.com/event_cookbook/]

Example

As part of the Department of Education's America Goes Back to School Initiative in September 1996, several dozen classrooms in **National School Network (NSN)** schools around the country participated in events that allowed them to email, chat, or videoconference with prominent government leaders, astronauts, authors, and sports celebrities. The positive response of participating schools prompted NSN to create its own program of online events, which ran the entire 1996-1997 academic year. This program ranged from a series of online chats with student journalists who had covered the 1996 presidential campaign, to a five-event celebration of Black History Month, to several online music performances followed by conversations with the musicians and composers, to a three-part series with scientists. The last online chat of the year included a group of student scientists who discussed exhibits of their work, displayed on NSN's Web site, in an online colloquium moderated by a professional scientist. Although these events were designed for students, they represent the types of activities that could be adapted for collaboration among educators. [http://nsn.bbn.com/community/index.shtml]

Online Chat

Online chat is hugely popular as a social medium; millions of people engage in chat via forums such as America Online or Prodigy. In online chat meetings, people come together, in real time over long distances, by typing into a computer. All comments are recorded on the screen, so participants can scroll back at any time to see what was said earlier. At the end of the conversation, ready-made minutes of the meeting are available. Some chat environments also include functioning Web pages and graphic "slides" that are displayed above the chat window. These types of multimedia features allow participants to

- Exchange pictures during introductions
- View photos illustrating a topic or point
- Show research graphs and charts

Chat technology has been used both in strictly online environments and in conjunction with other technologies, such as National Public Radio talk programs.

Example

The **National School Network (NSN)** sponsored a chat session between teachers in Boston and Mendocino, California, on integrating technology into project-based learning. The Mendocino teachers had experience working online to advance their project-based curriculum and shared their knowledge with the Boston teachers.
[http://nsn.bbn.com/bte/highlight.html]

Desktop Videoconferencing

Desktop videoconferencing allows people in two or more distant locations to speak with and view each other simultaneously. It allows users to discuss ideas, debate problems, and the like when face-to-face interaction is desired but not possible. Videoconferencing requires that each participant have a small camera and microphone attached to his or her computer. Many systems provide a text window, or some other form of shared workspace, in addition to voice and picture. In many desktop systems, the video often lags behind the audio and is refreshed only at prescribed intervals. This means movement can appear choppy, but students and teachers who have participated in videoconferences report that immediacy of communication, accompanied by visual presence, make the picture-sound lag tolerable.

Example

As a part of its research and development work for the NSF-funded **Teacher Enhancement Electronic Community Hall (TEECH)**, BBN conducted a series of activities called a "Small Experiment." About 30 people involved in teacher development from science museums and teacher network projects participated. One of the activities was a series of videoconferences using a prototype of an Apple desktop videoconferencing system. Prior to the videoconference, all participants were provided with a list of URLs for each others' Web pages and were asked to review these in preparation for the discussions. During the conferences, a shared whiteboard was used for drawings and for showing documents and videos.
[http://copernicus.bbn. com/WWW/small_experiment/experiment.html]

Useful Technologies

Many computer users have experienced chat environments using online services such as America Online and Prodigy. To participate in these "semi-public" discussions, you must have a membership in the service. There are also many totally public chat environments, which are open to anyone, all over the Web. In these types of environments, all you need is a Web browser to participate. Chapter 5 lists some public educational chat rooms.

Although there are many chat rooms available on the Web, you may wish to focus the conversation on a specific topic or restrict participation. You can do this by setting up a private chat environment. When an organization sponsors a chat, it must provide a server (the computer that manages the chat services and traffic), while participants run what is called client software (a program that allows them to participate in the chat). On the server side, the software allows the person administering the chat to create "chat rooms" (areas segregated by topic), moderate the discussion, create slides, and monitor accounts. The client software, much of which is available for free downloading on the Web, usually runs in conjunction with a Web browser like Netscape Navigator or Internet Explorer.

While videoconferences can be more immediate and exciting for participants than chat meetings, they also present more technical challenges. For videoconferencing, systems vary from the highly sophisticated, with document sharing capabilities, to inexpensive desktop systems. In lower-end systems the video, rather than flowing continuously, appears in successive screen shots that change several times a second. In order to work properly, each participant's computer requires a digital camera. The quality of videoconferencing is also dependent on the speed of a participant's Internet connection. Slower speeds can significantly degrade performance. See Chapter 4 for a detailed description of these technologies and tools that support them.

Online Courses or Workshops

Online courses are rapidly becoming a medium for distance learning, and collaboration is being used more frequently to support course-based professional development. While some argue that important aspects of communication are lost in online courses others note that online courses and workshops regularly achieve their goal of teaching participants something new and have the following additional benefits:

- They can be "attended" at any time, from anywhere. This means that people can participate who might not normally be able to, and participants have more time to reflect on what they are learning.
- Often people who are reluctant to speak up in a face-to-face environment participate more actively in an online environment.
- Online courses can be used to initiate a networked community. The course provides the introduction and common experience upon which to build.
- Online courses provide more opportunities for follow-up discussions long after the formal course is ended. A related discussion group can run for as long as participants are interested.

Not only do online courses provide material about a particular topic, they can also be designed to facilitate understanding and use of the medium. Courses delivered online usually have a specific time limit. They involve a moderator who "hands out" assignments, guides the conversation, and responds to students' questions.

Examples

The **Teachers' Learning Conference (TLC)** is housed in the Virtual High School out of Hudson, Massachusetts. The Virtual High School is an opportunity for eleventh and twelfth graders throughout the U.S. to take online courses from teachers at other high schools. The TLC teaches teachers how to develop and moderate an online course.
[http://vhs.concord.org/]

Some online courses, such as those provided by the **National Center to Improve Practice (NCIP)**, require users to introduce themselves via the Web to course members, in this way helping to build a sense of community and group coherency. Course materials are available online, and course interaction takes place online via a discussion group.
[http://www.edc.org/FSC/NCIP/]

Useful Technologies

Mailing list servers, databases, and discussion groups are all logical components of online courses. There is also dedicated software for supporting such courses. See Chapter 4 for a detailed description of these technologies and the tools that support them.

A final caveat: In thinking about these various ways to collaborate, it is important to differentiate server software (that resides on a server) from client software (that, when used, must reside on each participant's machine). Some kinds of interactive Internet applications demand special server software (e.g., most Web-based databases) and can be used by anyone with only a standard World Wide Web browser. Others, such as Web-based chat, may demand additional client software that enables a browser to access special capabilities. Some applications demand only server software, some demand both server and client software. Happily, most, but not all, client software is distributed free on the Internet.

This section has provided a discussion about different categories of electronic collaboration to help you sort through the myriad of possibilities for collaboration and identify issues surrounding different types of activities. It may also have given you some ideas about a collaboration of your own. The next chapter tells you how to design and implement an environment to support your collaboration.

3. It's Your Turn:
Designing and Implementing a Collaborative Environment

Designing a successful online collaborative activity and/or environment is an iterative, cooperative venture. That means involving participants in the design process, working with them to establish goals and define tasks that meet their needs and the requirements of the organization. Your initial environment should address current needs but also allow for growth as participation increases. The environment needs to be clear and easy to navigate so that participants can get to areas of interest directly. You also need to decide whether the activity should be closed, that is, restricted to smaller groups, and whether to have a moderator.

As you implement the design and your collaboration is underway, ways to improve the environment may become apparent. For example, when a discussion group becomes highly active, it may be useful to reorganize the group by topic or divide users into sub-groups with more focused agendas. Likewise, as users become more comfortable with a technology, they may be willing or even anxious to try new tools or formats. Be open to refining your design whenever such an opportunity presents itself.

This chapter tells you about some of the factors we've found to be important for successful collaborations, outlines the steps for implementing an online collaboration, and provides some tips on how to be a skillful moderator.

Planning an Environment: Components of Successful Collaborations

In our work, we have uncovered a number of factors that can contribute to successful collaborative environments. By providing you with the key concepts and some concrete examples, you, too, will be able to support your own online community. Understand, however, that there is no absolute formula. This is a fluid and rapidly evolving medium; you will have to experiment and improvise.

A Collaborative Culture

Among potential participants, collaboration should already be valued and viewed as important. The best results come when *participants* have had experience working collaboratively, whether or not that experience is on the computer. Our own experiences and research studies (Grudin 1994) suggest that when a teamwork approach is not appreciated by either those at the top or those in the group, the collaboration is not as likely to be successful. Having supportive administrators who are willing to give teachers time to collaborate online makes a collaborative online project significantly easier.

In reality, many schools do not have cultures that support collaborative teamwork. If you aren't starting with a culture that values collaboration, how do you promote one or cope with its absence? If administrators are not supportive, recruit participants who are willing to go the extra mile to make the project work. Once you've demonstrated the benefits of a successful collaboration, you may win some support at the top.

Another strategy is to have a moderator who's good at eliciting and valuing input from all participants by encouraging them to respond to each other; in this kind of environment, the value of collaboration becomes more evident to participants. The skills of a successful moderator are discussed later in this chapter.

A Task Suited to Collaboration

When planning a collaborative project, it's important that the task is one that can benefit from collaboration, traditional or electronic.

Example

A major component of the **Empire State Partnerships (ESP) Project** is a Web site intended to provide year-round professional development activities via the Internet for more than 100 artists and educators. One of the ESP project's first tasks was to design that Web site. The task of designing the site involved participants from different professional backgrounds (graphic design, programming, artists and arts educators) and different geographic areas. Collaboration was essential to the success of the process because of the geographic and professional diversity of the participants.
[http://www.esp-artsed.org/]

A Defined Focus

A collaboration's focus could be a specific activity, product, or common goal which is clearly articulated. It could be designing a product, producing a paper, or coming up with a solution to a problem. This method often works better than open sharing and discussion. As one researcher at BBN puts it, "This is not an idea that is intuitively obvious to many people new to using network tools." He describes a principal whose school had just been wired. The principal said, "I'll use it for staff development and have them talk about the new curriculum standards." The researcher notes that

such an approach has a danger of being too open-ended and amorphous; having a more defined focus for the conversation would help participants contribute constructively.

Example

NSN partnered with the **Online Internet Institute (OII)**, another NSF-funded project, to support an electronic institute where master teachers telementored teachers across the country. One activity of a proposed follow-up online course calls for reflection on practice. Each participant describes to the group an occasion that required an explanation or justification of an aspect of practice to someone else, addressing such questions as "What were the circumstances that caused you to explain or justify an aspect of your practice to someone else? Who was the audience? What was the particular challenge or issue that you needed to address? What strategies did you use to present your case?" Next the group members investigate the following together: "What do the reflections have in common? What are one or two interesting or important similarities across the group—in teaching situations, in approaches to teaching, or in issues of concern? Looking at the perspectives of others in the group, what are the most important issues expressed by teachers of math, science, or technology?"

Clear Benefits for Participants

One of the reasons for having an explicit goal or activity is that participants need to view the work as important and be motivated and sustained by the task. It is also important to stress the intrinsic benefits to be gained, for example, a chance to communicate with a wide range of colleagues with similar interests or to gain access to an expanded network of resources. Participants must be motivated because this process, and the technology itself, may take time to master. When teachers know that they will gain something valuable for this commitment, they are more likely to want to participate.

In addition, investigate whether there are tangible benefits that can help to recruit participants. Such perks might include receiving course credit, publishing work, networking, or gathering valuable information.

Example

The **National Teachers Enhancement Network** provides science and mathematics courses to teachers for graduate credit. Teachers participate in both private and group discussions online. [http://btc.montana.edu/nten/home.shtml]

Computer-literate Members

Ideally, users should already be comfortable with the communications technology, or at least have an interest in becoming technologically savvy. If participants are computer literate they will be less self-conscious with the medium and better able to concentrate on the content. Inevitably, there will be technological glitches. The moderator needs to either remedy them or pass the problems on to an accessible technical expert.

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If you are working with users new to telecommunications, you'll need to provide some hands-on training and be prepared for some long-distance hand-holding before users are comfortable with even simple software like email. It will be well worth the time you spend training participants, because if they're unable to access or respond to messages because of inexperience, they simply won't be able to participate.

Example

Prior to a chat session between teachers in Boston and Mendocino, California, on integrating technology into project-based learning, NSN and the **Boston Teachers Exchange** sponsored two online training sessions for participants in the communication tool *ichat*. [http://nsn.bbn.com/bte/highlight.html] [http://www.ichat.com/]

A Sense of Community

Most teachers like interacting with other people—after all, that's what they do all day with their students. Yet the nature of electronic collaboration at first might seem impersonal. What you can't get from a computer are non-verbal cues, eye contact, and body language. On the other hand, in one sense electronic communication can make it possible to get connected to others when it's not possible in real life, because time and distance are not an issue. Once you've established a way to communicate, the relationship can continue indefinitely.

Example

The **DASH** online collaboration for Vermont science teachers began during the 1997-1998 school year. The group met first during a two week summer workshop in August 1997 where they familiarized themselves with one another and the curriculum. In the fall, participants began discussing standards issues electronically.
[http://www.lab.brown.edu/ocsc/coll_for_reform/Collaboration.VT.html]

Some people argue that the first meeting should be face-to-face so participants make a personal connection from the start. If it's feasible, we suggest convening at least one face-to-face meeting and preferably more—in addition to online communication. Personal meetings are a way to establish a group identity so that members get to know one another and feel comfortable sharing their deepest thoughts. The best work happens when group members trust each other enough to take risks. When in-person meetings aren't possible, you could call a telephone conference or try interactive videoconferencing.

Other practitioners believe that face-to-face meetings aren't necessary. Because online discussion allows a sort of anonymity, it promotes a different type of bonding and more personal interaction. The communities that are formed can be very strong.

Example

New American Schools sponsored an online course for teachers called "Sharing Our Stories," which was developed by the Co-NECT Schools design team using a combination of interactive technologies. The participants never held a face-to-face meeting for geographic reasons, but had great success building community electronically. The purpose of the course was to teach participants how to use a variety of online tools for collaboration in the context of their work as teachers involved with educational reform. For seven weeks, teacher volunteers participated in weekly chat meetings, posted reflections to a threaded discussion group, and contributed pictures to the course Web site. Project moderators used a variety of community-building activities:

- At the beginning of the course, participants completed a form on the project Web site to introduce themselves. Questions were designed to elicit more information than just "I'm a sixth grade teacher from Texas." For example, "What's the most exciting thing you've done with your class this school year?" The completed forms automatically generated a personal Web page for each participant.
- The first assignment was for participants to submit pictures of themselves. These were posted on the Web site along with the introductions.

Participants were asked to submit pictures of their current activities once a week, along with a short caption. Many of the pictures revealed a lot about people's personalities. [http://www.naschools.org/finals/] [http://www.co-nect.com/]

Participants must feel safe and secure in their online group. Not only must they trust one another in order to be candid, but they have to feel that their conversations are not being critiqued and evaluated by supervisors or superiors, or even peers. When participants are all of the same work or social status, or are not competing for information, they are more likely to be honest.

Examples

In one online conference in the Boston area, teachers requested restricted discussion groups for some topics. The conference was for teachers only; administrators were excluded. The group also decided to limit itself to a subset of teachers. They wanted to try out new ideas before sharing them with the larger group.
[http://www.lab.brown.edu/ocsc/coll_for_reform/Collaboration.MA.html]

* * *

The **Video In Support of Teacher Activities (VISTA)** Enhancement Project at BBN sponsored an electronic collaboration for educators who use video. Some participants didn't want to share trade secrets because they felt they were competing with other group members for limited funds. [http://copernicus.bbn.com/vista/index.html]

Size can make a difference in how people feel about the community. There is no magic number, but between ten and fifteen participants has been found to work well; it is intimate enough to build community and let

everyone have a voice. Large numbers can frustrate members because they may not have a chance to talk as much as they would like or need without being overloaded. Sometimes in large groups, only a core group verbally participates; the rest observe and absorb the conversation. That is not necessarily unproductive: it depends on what the members' needs are.

To build a balanced community, combine seasoned teachers with newer ones. Including participants of different career stages can enrich both groups of educators. More experienced teachers can share their educational bag of tricks with those new to the field, who can lend fresh perspectives. A combination of different teaching levels can make for a lively learning atmosphere. There's less risk of the collaboration being non-stimulating.

A Skilled Moderator

Communication is often best fostered when supported by a moderator who knows the content, is comfortable with the technology, and has the ability to draw out and inspire the participants. If necessary, the moderator must be able to change the course of the conversation or the size of the group, or to reorganize the collaboration by topic if the needs of the members change. Remember, electronic collaborations are highly active and interactive, and it is not always possible to determine in advance the path that the discussion will take. (See the section below on how to be a skillful moderator.)

Example

The **Brookline Investigations Math Pilot (BIMP)** group was created to bring elementary grade teachers together to understand and implement a new math curriculum. This collaboration used two moderators to facilitate their online dialogue—both experts in math for young children. They also had easy access to a technical expert if participants needed technical support. Participants logged on to the conference three to four times a week, posting thoughtful messages at least twice a week. In the beginning, the math specialists took the lead in moderating the conversation. They asked questions, posed scenarios, and suggested that teachers try specific strategies and activities. Later in the project, teachers took a more active role in shaping the discussion. [http://www.lab.brown.edu/ocsc/coll_for_reform/Collaboration.MA.html]

A Flexible Action Plan

All along, be sensitive to the possibility of exploring unplanned paths and "going with the flow," while at the same time keeping your mission in mind. You want to make sure the project has a defined beginning, middle, and end. The beginning should be a coming together, getting-to-know-you phase. The middle is when the major part of the work occurs. In the end, or wrap-up phase, you need to evaluate your project and ask participants for their feedback about the process and the product.

Other Considerations

The components of an online collaboration need to meet both the needs of the users and those posed by the collaborative tasks themselves. Depending on the level of collaboration your project will support, you may need to consider one or more of the following components when planning an environment.

- ***Private spaces for communication.*** If participants are to talk about sensitive issues, reveal their own learning needs, support needs, invest the time to reflect thoughtfully, they need to be assured that their conversation is being "heard" only by those intended to hear it. Just as people have meetings face-to-face with a particular group of colleagues, you need to provide a mechanism for limiting participation.
- ***Public areas for publishing or reaching larger audiences.*** Once ideas have been fleshed out in limited discussions, participants may want a way to publish their ideas or products to a public audience. Being able to reach a broad audience in a timely manner is a great advantage of the technology.
- ***Databases for information storage and retrieval or for archiving a discussion.*** Colleagues from different locations and areas of expertise can contribute to a pool of resources for all participants.
- ***Search engines to aid participants in finding needed information.*** As the online environment grows and resources are added, users need to be able to find what they are looking for, quickly. If not, they will go "somewhere else."
- ***Site maps or overviews of what is available.*** Participants should be able to get to any page on a site within a few clicks. Users need to know the elements of the environment and be able to see the connections between them.
- ***Document sharing capabilities.*** If your collaboration is going to produce a product such as a paper or assessment rubric, or even exchange ideas about student work, participants need to be able to easily share work. A big advantage of electronic collaboration is that users can share text, video, and audio.
- ***Synchronous conferencing capabilities.*** When it's advantageous to have the give-and-take of a conversation rather than the asynchronous nature of writing, consider including a capability for chat or videoconferencing.

Chapter 4 describes tools that enable you to customize your environment to include these capabilities.

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Implementing the Project

We present below an eleven-step process for implementing an online collaborative project. Each step is followed by examples from two school based collaborations. The first is a group of elementary school teachers in Brookline, Massachusetts, who had to introduce a new curriculum called *Investigations in Number, Space, and Data* to their students. A goal of the Brookline Investigations Math Pilot (BIMP) project was to choose assessment activities from the *Investigations* curriculum and design rubrics for evaluating students' concept of number sense. The hope was that teachers would better understand students' development of number sense by examining examples of pupils' work. This knowledge would help them define a set of benchmarks for assessing students' learning.

More information on the BIMP project can be found at [http://www.lab.brown.edu/ocsc/coll_for_reform/Collaboration.MA.html].

The second, the DASH Collaboration Project, is an online collaboration of fourth and fifth grade teachers from Vermont whose school districts are encouraging teachers to consider using a comprehensive K-6 science curriculum called Developmental Approaches to Science, Health and Technology (DASH). In response to a request from these districts, the University of Vermont's School Development Institute (SDI) organized a two-week DASH summer training workshop for interested teachers. That workshop is being followed up with an online collaboration to provide additional support to volunteer participants, many of whom are geographically isolated from one another.

The activities of the DASH Collaboration Project include both general knowledge-building about teaching and learning in the DASH environment and identifying a set of benchmarks which relate student understanding to the Vermont Framework. In addition to the online collaboration the group scheduled three face-to-face meetings during the collaboration. Those teachers who elected to take the DASH training for graduate credit and who also participated in the online collaboration were allowed to count the collaboration towards the fulfillment of the credit requirement. To find out more about the DASH project, visit [http://www.lab.brown.edu/ocsc/coll_for_reform/Collaboration.VT.html].

Once you've thought about the components of *your* environment, try this step-by-step approach or adapt it to suit your own purposes. The goals of each individual project will determine what works best.

1. Determine goals.

Ask people who will be involved in the project, such as school administrators, curriculum coordinators, and lead teachers, what they want

to accomplish. They may not be sure of the goal itself, so discuss their needs and refine the plan.

Examples

BIMP	DASH
The **BIMP** coordinators asked these questions: What curriculum are you concerned about? Within that curriculum, on what do you want to focus? What changes are you looking for in your classrooms? Why do you want to make these changes? Do you really understand the curriculum improvements, and if not, what can we do to help? Would outside experts be beneficial?	Online collaboration was offered as a voluntary follow-up professional development option for interested participants in a summer workshop. Since a subset of the workshop teachers intended to earn graduate level credit from the University of Vermont by extending their DASH professional development beyond the summer workshop, the workshop organizer offered the online collaboration as one of the mechanisms for working toward that credit.

2. Decide when you want to begin the project and the guidelines for communicating.

A first meeting could be face-to-face. Some participants may need to feel the sense of recognition that this can elicit. It's a way to build trust and a relationship from the beginning. Subsequent meetings would be conducted online.

Examples

BIMP	DASH
The **BIMP** project began with an in-person meeting where participants got to know one another, discussed and clarified the goals of the project, and refined an action plan. The next day, teachers began conversing online about pressing issues in the new math curriculum. The electronic collaboration was supplemented with face-to-face meetings every six weeks that had specific topics, such as selected readings and strategies for assessing student work. These in-person discussions fueled the conversations online and vice versa.	The ten-day **DASH** training workshop was a great opportunity for participants to establish personal and professional relationships with one another. This opportunity to work together face to face was one of the main reasons for inviting the DASH group to participate in the online collaboration. The project group also gathered in October for a "kickoff" meeting and has planned at least two additional face-to-face meetings during the project.

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3. Decide how teachers will be compensated for their extra time.

If the collaborations take place during school hours, find out whether teachers will have classroom coverage. If it is a summer project, find out if they are eligible for stipends. Investigate whether they can receive professional development credits through their school system or local university. This can be a major selling point, so make sure you have these answers before approaching teachers.

Examples

BIMP	DASH
Through external funding, the BIMP project provided substitute teachers for the times when face-to-face meetings were held. They also offered professional development credits toward recertification.	All participants in the DASH collaboration were offered the opportunity to receive professional development points for their participation in the project. In addition, teachers who elected to take the summer workshop for graduate-level credit could opt to have participation in the project count as one of the requirements for earning that credit. Most of the teachers participating in the collaboration are not involved in the graduate credit program.

4. Advocate strongly for your online conference.

This is where you need to frame your mission carefully. Try to anticipate the reaction to your request of administrators or others whose support you will need. For example, are they willing to fund the purchase of new hardware or software? Will they authorize release time for participants? Will they help recruit participants? Be prepared to meet negative responses with examples of successful collaborations by other groups.

Examples

BIMP	DASH
BIMP project coordinators described the program to key administrators, including the assistant superintendent of curriculum and all principals involved, and made sure they understood the goals of the project. The school system's math coordinator was involved in the planning and execution of the collaboration from the outset.	Since support for the DASH online collaboration initially came from the state and not the local level in Vermont, most of the effort to advocate for the project after its start was directed to state-level educators. Those who authorized and supported the project received regular progress reports. Many of the DASH-using teachers are in a tiny minority of teachers within their own schools.

5. Prepare a preliminary action plan/proposal that details what you are studying and when.

This is your chance to articulate your goals and lay out an initial timeline with specific benchmarks. The proposal can serve as a starting point for discussions.

Examples

BIMP	DASH
The BIMP proposal was issued as part of the invitation to join the collaboration. It was a brief description of what project coordinators envisioned for the collaboration. An action plan was formulated after the participants were selected. It outlined the agendas for the four face-to-face meetings that were planned.	Coordinators for the DASH collaboration identified potential themes for their collaboration, such as the sharing of stories of student inquiry as they engaged with the DASH curriculum, and the identification of benchmarks or pieces of student work which correlated with elements of the Vermont framework. They also agreed that the final design of the collaboration content should be developed by the participating teachers.

6. Establish what hardware and software are available, and think about the features you want your environment to have.

When planning a collaborative environment, it's probably safe to assume that users do not all have the same software and will have to acquire it, unless your group members all have access to similar hardware, software, and technical support. Think in terms of the existing infrastructure and its implications for choosing a computing environment:

- Do users have access to the Web, or only email? If email is the most common denominator, your group's interactions will, in most cases, be limited to text only. If most participants have access to the Web, they will more likely be able to display graphics or share information synchronously (in real time).
- What kind of computer access do participants have? Some teachers may only have access from their school libraries once a week or so; they will be overwhelmed by more than a few messages a week. Others have computers in the classroom or at home and can handle several messages a day.
- Does everyone have similar hardware and computing power? If your group members all belong to the same organization and have access to similar hardware, software, and technical support, you can choose a particular groupware (software that supports collaboration). If your participants come from different computing environments, think about using a system with the least common denominator, such as a mailing list server, since more sophisticated

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systems are likely to exclude some people. Even with mailing list servers, you may run into differences in users' level of access.

Examples

BIMP	DASH
Brookline was already using the *FirstClass* electronic conferencing system, so BIMP project planners did not need to make a decision about groupware.	In the first phase of the DASH project *FirstClass* was used, using server space provided by BBN/Brown LAB's Online Collaboration for Reform Project. This project has since transitioned to a Web-based discussion environment, *AltaVista Forum*. [http://forums.lab.brown.edu/disc/ocsc/dispatch.exe]

Many other questions need to be considered when choosing tools for collaboration. Chapter 4 provides more information on this process and some of the tools available today. See also *Evaluating Groupware for Net-Based Collaboration* (Watt *et al.*, 1998). This paper considers some of the groupware tools currently available to support net-based collaboration among educators. [http://www.lab.brown.edu/ocsc/Tools.html]

Keep in mind that you may not have a choice at all. It's possible that your hardware can only support certain software programs, or your school district may already be using a specific type of groupware.

7. Identify those you want to join the project and how you are going to invite participants.

You might decide to solicit volunteers either through email or word of mouth. If you want participants who are already comfortable with Internet technology, posting an announcement to a mailing list server or on a Web site are good choices. To find an appropriate mailing list server, check indexed lists of newsgroups and mailing lists such as Reference.com [http://www.reference.com/] or the List of Lists [http://catalog.com/vivian/interest-group-search.html].

You might also consider approaching principals. Once convinced of the merits of your proposal, many may be willing to promote your project at meetings. Still another option is to send an invitation via the regular mail or in a teachers' newsletter; make sure you send a copy to other potential supporters such as principals, department heads, and the superintendent of schools. In the letter, be specific about your goals. Let potential participants know how much time out of the classroom this could require and mention classroom coverage and/or stipends if they are relevant. Provide enough details to make the project understandable, but let them know it will be an evolving, fluid experience. Also, give a date for the kick-off meeting.

Do you want to have an application process or include all volunteers? If it's a competitive process, provide information about both the application process and your methods for choosing participants.

Decide whether you want to bring in outside professionals. If so, who are they? Find out if they are willing to participate. Consider having a computer teacher be part of the conference, so you have built-in help for any technical glitches that may occur. Be sure this expert is aware that you may be asking for technical assistance as problems arise.

Examples

BIMP	DASH
Potential BIMP participants were invited to join the collaboration in the winter of 1997. A message was posted in a general *Investigations* users' conference, which had been established on Brookline's *FirstClass* electronic conferencing system for all K-5 teachers and specialists.	The DASH project asked the workshop leader to participate, and she asked that all fourth and fifth grade teachers attending the workshop be invited to participate in the online collaboration. The moderator supported this idea, since it was her experience that those teachers were more likely to have experience with Internet technology than teachers in the early elementary levels. During the workshop, the collaboration was announced as a fourth/fifth grade project, and nine teachers submitted applications to participate. In addition, consultants from BBN Technologies were to provide technical and general educational support to the collaboration and to provide specific planning and organizational support to the moderator throughout the project.

8. Select the participants and the moderator(s).

Consider the number of people who can participate while keeping the work manageable and the feeling personal. Depending on the group's experience with Internet technology, you may want to use more than one moderator—one for content issues and one for technical support.

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Examples

BIMP	DASH
BIMP coordinators selected six second and third grade math teachers and two math specialists from an R&D organization at a local university to join in the electronic collaboration. All teacher participants were regular contributors to the town's email/ conferencing system and were comfortable with the technology. BIMP coordinators opted for two moderators: one an experienced telecommunications user and the other an expert in mathematics for young children.	The DASH project coordinators had previously decided that ten participants would be the upper limit for the project, so they accepted all nine volunteers. The moderator, a classroom teacher who had worked with the Vermont Institute of Science, Math and Technology (which helps assess the alignment of curricula and state frameworks), was appointed as soon as planning for the project began.

9. Prepare for the first group encounter.

Arrange for participants to come together for an initial meeting. Like any other first encounter at a teachers' seminar, participants should introduce themselves, explain why they are interested in working on the project, what their expectations are, and what they think they can contribute and learn. Make sure you have a skilled moderator who can help you conduct the meeting. (See the next section on being an effective moderator.) Review the preliminary proposal with the group and make sure it is on target, or at least within range. Discuss changes that need to be made. Make sure everyone is still on board. Does the project need to be substantively revamped or can the work begin? Before you close the meeting, define the next step, whether it be overhauling the plan or convening online to begin the collaboration.

Examples

BIMP	DASH
BIMP participants decided they would prefer to create a separate, smaller, and more private electronic conference rather than carry on their work in the larger *Investigations* user conference. The electronic conference allowed them to post to all the members at the same time. Brookline's math learning objectives were also posted in folders within the conference so that teachers had easy access to those documents. BIMP was now their personal work and think space.	To launch their collaboration, the DASH project held a one-day, face-to-face meeting, which began with teachers sharing stories about the first set of science activities they had done with their classes, followed by an introduction to other aspects of the curriculum not covered in the face-to-face workshop. Following the session on DASH, the participants received training in the *FirstClass* software.

10. Let the discussions begin!

The moderator can take the lead in raising questions, posing scenarios, and offering suggestions for strategies and activities. Once participants get comfortable with the technology, they will likely take a more active role in shaping the discussion.

Examples

BIMP

The initial **BIMP** face-to-face meeting helped to generate some topics of interest for the online discussion. Two moderators shared the role of facilitating the online dialogue. They and the other participants posted two types of messages: management (25%) and content (75%). Management messages dealt with topics like the following:

- Scheduling meetings
- Asking permission to share parts of the dialogue with outsiders
- Keeping parents and specialists involved in the curriculum
- Trying to solve technical problems

Content messages were the essence of the dialogue and focused on math issues and students' learning styles. These messages often concerned strategies teachers were trying out in their classrooms:

- Borrowing and subtracting
- Adding versus subtracting, or counting up or down
- Oral versus written explanations
- Students' problem-solving approaches
- Gender and cultural differences and risk-taking
- Student peer teaching
- Importance of geometry and building 3D shapes
- Including parents in homework activities

DASH

The day after their kickoff meeting, the Vermont moderator sent the first message of the collaboration. It encouraged teachers to share more of the implementation "start-up" stories they had started to share in the DASH session on the previous day. At the beginning, only six teachers in the group had Internet access; all of them logged on and read messages, but only two actively participated in the discussion. They dealt with a range of topics:

- Importance of student ownership of ideas and activities
- Observing student thinking
- Classroom pets (DASH encourages them)
- Homemade weather stations
- Standards and assessment
- The need for teachers to support each other in DASH work
- The logistical challenges related to some DASH routines
- Expenditures for materials
- Difficulties experienced by teachers with the DASH approach
- Alignment of DASH with Vermont standards
- Schedules for when to start various units

11. Now that you have a new community of learners, make sure they help you evaluate the project work.

Evaluation should be an ongoing process to which all participants contribute. The group's moderator can help guide this process by regularly asking the group about their progress.

Examples

BIMP

At the end of the school year, the **BIMP** project coordinator posted a questionnaire for BIMP teachers asking for feedback on the collaboration. Questions included: "What were your expectations for the project? Were they fulfilled?" "Were the face-to-face meetings important to your participation in the online discussions?" "What difference do you think BIMP made in your teaching Investigations Math?" "Would you like the conference to continue?"

Overall, participants believed the project was a success. They felt their electronic collaboration was an improvement over professional development seminars. Most said it changed the way they taught math. One participant felt she used math games more effectively than before; another began to involve parents more in the curriculum. The majority of participants claimed they gained a deeper understanding of children's developmental abilities, which also informed their teaching.

There were also drawbacks to this medium, however. Some participants said it is harder to write, rather than speak, ideas, and missed the personal contact. Others preferred immediate feedback—something they did not always receive with this electronic collaboration. All the teachers reported that the face-to-face meetings were critical to their motivation and participation and trust in one another when they communicated online.

DASH

At the time of publication, no formal evaluation of the DASH project had been conducted. Limited participation in the first phase of the project was partly responsible for the decision to move the discussion from a *FirstClass* to an *AltaVista Forum* environment.

How to Be a Skillful Moderator

The moderator's role is key to effective electronic collaborations. He or she has to be on top of the subject matter and conversation, recruit and sustain participation, guide the discussion, modify the pace when needed, interject salient comments and feedback promptly, restate the main themes, introduce new topics, reintroduce a previous point that was never fully explored, offer instructions, and keep track of who has participated and what each member has said. The moderator (also known as a facilitator) needs to be aware of members who have not contributed and draw them out, maintain the focus, know when it's time for a face-to-face meeting, and how to end the conversation—for the moment—and the project.

There is no magic formula to accomplish these tasks. What makes a moderator's role interesting is her unique personality, and it is that personality which helps inform the group's identity. At the same time, the moderator needs to blend in with the group and truly be one of the members rather than an outside expert. Once the momentum picks up and the group begins to work as a team, the moderator can step back a little and allow other participants to share the lead. In short, being an adept moderator takes a good deal of finesse.

Some people are natural moderators; many others need guidance and practice. There are ways, however, to hone your moderating skills. Moderating online environments is a developing field of expertise.

Setting the Tone

The moderator's welcoming words should be similar to those of a host warmly inviting friends into his house or a teacher greeting fellow colleagues at a seminar. That means making them feel comfortable and valued from the start. The moderator has the opportunity to create the kind of "home" he wants to have in the virtual group. The facilitator might even want to discuss the kind of atmosphere everyone would find comfortable and successful. That might be focused yet lighthearted, reflective, creative, supportive, or some other overall tone.

The first message to the group should be well-considered and delivered. One moderator we are aware of always says, "Welcome to the" and gives the name of the conference. She describes who is in the group, recaps their mission, and explains how the conference will be used. Then she poses a question or initiates an activity that will get the conversation moving.

✿ Moderator's tip: Being humorous can add levity to serious work and help participants relax.

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In one computer specialist conference, for example, when members were frustrated by a technical problem that was complicated and a nuisance, the moderator quietly typed, "Would you like to try my magic wand?" and then went on to offer a more substantial solution. The comment broke the mood, made members smile, and put the situation in perspective. The moderator can, by example, also encourage others to be playful when appropriate.

Nurturing the Conversation

Once the tone has been set and the work begun, the moderator needs to be sensitive to which members are contributing regularly and invite others to comment. If there are one or two members who "talk" too much, the moderator might try involving the rest of the group by writing a general message. It might read, "John and Andrea believe..." "What do others think about that?"

✿ **Moderator's tip: Be familiar with the work individual members are doing in their classrooms and school districts and introduce their approaches into the general conversation.**

One moderator said she often knows what kinds of projects or new strategies some of her electronic colleagues are doing in their classrooms. So she might type, "I know Sharon is trying out this activity she calls 'Math Talk' where she poses an activity to the whole class and asks students to orally brainstorm before they use pencil and paper to solve the problem. I'll ask her to describe her technique in more detail to the group and then I'll ask people to respond to her."

✿ **Moderator's tip: Take time to reflect.**

Once the conversation has had a chance to develop substantively, the facilitator can pause and determine the main themes that have evolved, and then focus on those themes. One moderator said that if she had taken the time to review, recap, and re-question some of the issues that were raised, she could have helped guide the discussion to themes more relevant to the product and her group would have been more results-oriented. "I didn't know how important this was," she mused. "I wanted to be sensitive to the needs of the teachers so we sometimes got off on tangents that took a lot of time away from completing our project. It's not that we didn't do good work and the tangents weren't important, but somehow I felt I wasn't at all insistent that they stay focused on our task, and perhaps I should have been."

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✿ Moderator's tip: Encourage participants to post all their messages to everyone, even if they are addressing one member only.

These comments are usually more specific than messages to the whole group and can spark insights from others in the conference. If Andrea were to write to John, for example, she might say, "Hi, John, I really liked what you are doing to get your second graders to think about estimation. With your method, what would happen if you asked them to estimate 318-50? Would that stump them?" If that message is sent as part of the conference, another second grade teacher might ask, "John, what method is Andrea talking about? I'm interested, too." That will pull in other participants and, at the same time, help them think about their own classroom practices.

✿ Moderator's tip: Try what one moderator calls "seed messages."

This is where either the moderator or a participant asks a direct question or makes a specific request. At the end of the message, the member invites other participants to try out the idea in their lesson plans and report on what happened. This is a way to get teachers to experiment with different strategies and for the whole group to get feedback on what works and what doesn't.

Another type of seed message asks the teacher in one grade to compare what she does with a teacher in a different grade to figure out her students' capabilities. In one conference, a second grade teacher wanted to know why her pupils said that subtraction was so difficult. She was wondering if developmentally they would find it easier in third grade and if there was anything she could currently do to move them along. The teacher sent a message in her math conference to third grade teachers in the group asking for their insight. One reason the teacher knew to try this technique was because the moderator, from the beginning, had encouraged and modeled this approach.

✿ Moderator's tip: Be sensitive to the participants' school schedule.

Realize that during certain times of year, particularly during parent conferences and vacation, the members will be on overload. Therefore, don't ask them to do the bulk of their thinking at those times. Expect that there will be some slow times, along with an ebb and flow of activity directly connected to other responsibilities teachers have; anticipate and allow for these occurrences when planning the project. "I panicked when there was no activity for two weeks," said one moderator. "That was during parent conferences and school vacation. But we did not lose momentum

and the conference was really buzzing when the teachers returned, both physically and psychically."

Avoiding Getting Side-Tracked

If outsiders want to contact the group, insist that they do it through the moderator. "I don't want what they say to the group to derail us," said one moderator. "They might not have anything to say about the specific conference, but instead, want to reach those people for other reasons. That could be to tell them an event is happening in the school district or asking or soliciting them to participate in something else. But it has nothing to do with what we are discussing and it is distracting." In this case, you can ask the sender to pass the message through another means, or, if appropriate, you can send it only to appropriate members of your group via a different mechanism.

Dealing with Technical Glitches

Sometimes members of the conference have specific technical problems that need attention. The moderator must be able to help without disrupting the rest of the group. Either he writes an individual message with a solution to the teacher or makes arrangements with an outside expert to take care of the glitch. The moderator can't ignore technological issues; they can ruin a teacher's participation. If you've included a computer specialist in the conference, you'll have a ready source to turn to. If this expert does not have the time to stay constantly connected with the group, at least members know that person is available if needed.

Evaluating the Project

Evaluation should be an ongoing process to which everyone contributes. The moderator must regularly ask participants about their progress as a group in order to assess if the project is on track and whether they feel that it is valuable. He might ask some of the following questions:

- "What were your expectations at the beginning, and are these expectations being met?"
- "How would you compare how comfortable you feel participating now to how you felt at the beginning of the conference?"
- "Is our work together helping you in your classroom?"
- "How could we do a better job?"
- "Compare how you think this rates to participating in offline discussions."
- "Are the face-to-face meetings important to your participation online?"

- "Have the suggested activities and readings deepened your understanding of the topic?"
- "How do you find the time to participate in the conference?"
- "Are there things that the moderator could do to make your participation in the conference better?"
- "Thinking back over the last few months of this conference, what has been most valuable to you? Least valuable?"

These questions are essentially asking, "How are we doing?" It is a way to make sure the group is accomplishing the goal that they set, and to find ways to improve on the project. It also helps ensure that everyone is involved in the process.

Closing the Conversation

There are two reasons the moderator will have for closing the conference. One may be during extended breaks, such as summer vacation, when the online activity may be slow. Of course, the advantage of a virtual environment is that the conference is there 'round-the-clock for any member who wants to participate. The other time to close up shop is when the project is completed.

The group may decide it wants to continue communicating informally about related subjects without the moderator. In this case, the moderator might choose to become a member of the group and step aside as the leader. Regardless of whether the group stays intact, the leader will still need to put an end to her role as the moderator.

The moderator will want to recap the highlights of the project and the online experience with the group, as this will bring closure to this particular work. Wishing everyone well and thanking them for their hard work will make them feel appreciated. Later the moderator should think about how she performed as the leader and what could have been done differently.

If an evaluation questionnaire is distributed and collected the moderator can use the results to prepare a summary of the work. The summary might include what was accomplished, striking successes, what was learned, what additional supports would improve the collaboration, etc. The summary should be submitted to administrators who supported or otherwise enabled the project. Providing this kind of closing report should make it easier to get support for similar projects in the future.

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High-Tech Tool Talk:
➢Discussion Groups
Data Collection & Organization
Sharing Documents
Synchronous Communication
Online courses or workshops

4. High-Tech Tool Talk: Choosing a Technology

Choosing the right tools for a collaborative environment can be a complex undertaking. You have to take into account not only the goals of the collaboration itself, but also the technical know-how of the participants and "physical" limitations, such as compatibility of computers. This chapter provides a framework for helping you decide on an appropriate technology given the many variables that must be considered. Keep in mind that there are many Internet groupware products in development and many that are still merely just ideas that derive from brainstorming sessions. It is a fast, fluid, evolving field that will most likely offer significant products and uses that have the potential to transform the current state of education. For further information on these issues see the paper entitled "Evaluating Groupware for Net-Based Collaboration" [forthcoming at http://www.lab.brown.edu/ocsc].

With a desktop computer, you can do word processing, manage your finances, or use many other types of applications; no special additional hardware is required. To communicate with somebody at a different computer, however, your computer needs to be connected to a network (via a direct cable or a telephone line using a modem) and have a communications program *(client software)*—such as an email program, a Web browser, or some other specialized software—installed on it. The person you're communicating with needs to have the same setup on her computer. Between the two of you, on the network, is a computer called a server that has software to manage the communications (*server software*). Typically, end users do not ever have to be concerned with servers; once you're connected to the network and have some sort of communications software installed on your desktop computer, you're ready to go. All communications software—whether it be email, Web-based, or other types of programs, like desktop videoconferencing—works on this same client/server model.

Software that allows you to collaborate electronically is called groupware. Groupware allows people who work on different computers or in different places to have access to the same information and contribute to it. This can be as simple as two people communicating directly via email, or can involve a much larger group of people participating in a discussion group or using a mailing list server.

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When considering what kind of groupware to use, you'll need to ask some of the following questions:

- What are its capabilities? In other words, what can it do for you?
- How easy is it to use?
- Do all the participants have common hardware and software?
- Will you be adding members whose hardware and software may be different from the rest of the group?
- What technical requirements are there, and is your hardware powerful enough to support the groupware program?
- What kind of technical support will participants need?
- Will your members' interactions be limited to text only, or will they need to display graphics or share information synchronously (in real time)?
- Will you need to archive conversations that will help participants identify issues and allow new members to catch up on the dialogue?
- Will your discussion have many sub-topics that will benefit from a hierarchical organization (threading)?
- If your collaboration will be synchronous (real-time), do you simply need a whiteboard feature, or are audio and video important?

The rest of this chapter tells you about some of the technologies available (tools for discussion group, data collection and organization, sharing documents, online courses, and synchronous communication) and gives some examples of how collaborative projects have used them. Once you understand the benefits of specific types of groupware, you will be able to advocate for the kind you feel best fits your collaborative project. If your organization already has hardware and/or software, you may want to modify the plans for your collaboration based on the existing infrastructure. If you're starting with a clean slate, read this section with an eye to choosing the technology that best suits your collaboration.

Tools for Discussion Groups

Among all the tools available for electronic collaboration, those for discussion groups offer the widest range of options. They range from simple email and mailing list server programs, to Web-based tools that support topic-oriented discussions or threaded discussions, to integrated groupware, which combines group discussion software with more advanced features.

Stand Alone Email, Web-Based Email, or both?

Email is the most familiar form of online communication. All email tools are text-based, although some allow you to attach documents created in

other applications. There are two main kinds of email-based tools: simple email and mailing list servers.

Because the World Wide Web is becoming a ubiquitous part of network activity, many recent versions of email software allow you to click on URL addresses sent as part of email text and automatically open your Web browser to go to that address. Many Web browsers such as Netscape Navigator and Microsoft Explorer have built-in email, so it's easy to switch between applications within a single program. The advantage of dedicated non-browser email programs is that they often have more mail features than Web-based systems. The disadvantage is that you have to switch back and forth between two programs—email and your browser. When you're considering discussion group tools, you may need to investigate the features of dedicated and browser-based email programs and determine what makes the most sense for your organization, or you may leave the decision up to participants.

Communicating using Web based tools often has the following additional features:

- Information is stored on a dedicated server so people can look at it in an organized and centralized place whenever it's convenient. This means you can change the way archived information is displayed (for example, by date, author, or subject).
- It supports multimedia features such as graphics, photographs, audio, and video.
- It allows for true interaction—users can add information to Web pages (for example, via forms).

Similar to email attachments, you can download files from the Web, but, as with email attachments, you need the appropriate application to read the file.

Most Web-based discussion systems and mailing list server archives incorporate some type of sort and search capabilities. The simplest of these allow sorting by subject, date, or author. More sophisticated systems allow sorting by key words entered at the time a message is posted. Some discussion systems also allow full text searches of all documents in a discussion. This means users can search for words or phrases in a set of messages, similar to searching a single document with a word processor.

Email Tools

Email itself is the simplest form of online communication: it allows the exchange of text between two or more users. You can store email messages on your local computer and sort them by date, subject, sender, or other categories. Most email programs allow attachment of documents of any

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kind, but difficulties sending attachments successfully from one email system to another are not uncommon. In addition, if the attachments get through intact, recipients must have the appropriate software on their local computers to be able to "read" the attachments. The biggest advantage of email is that it is the lowest common denominator of Internet communication and therefore will reach more people than any other medium.

Like other forms of online communication, because of the lack of vocal inflection, gestures, and shared environment, email is not as rich a communication method as a face-to-face conversation. Email discussion groups are well suited to information exchanges, which can be handled in a single session or take place over extended periods. Some common email programs:

- **Eudora** [http://www.eudora.com/]
- **cc:Mail** [http://www.lotus.com/home.nsf/welcome/ccmail/]
- **Netscape Mail** [http://home.netscape.com/products/]
- **Microsoft Outlook Express**
  [http://www.microsoft.com/products/prodref/578_ov.htm].

Tools for Archiving Email

Even though email is not organized by topic, its popularity has generated some efforts to create a way to organize messages on a Web interface. Such interfaces allow users to browse an archive of email messages on the Web. **Hypermail** is one example of such an interface. Hypermail is a program that takes a file of mail messages in UNIX mailbox format and generates a set of cross-referenced HTML files that appear as a Web page. Each file represents a separate message in the mail archive and contains links to other messages, so that the entire archive can be browsed in different ways by following links. The archives can be updated, allowing incremental updates instead of rebuilding new archives from mail files. In addition, Hypermail will convert email addresses and URLs within a message to hyperlinks so they can be selected.
[http://salam.cae.wisc.edu/hppd/hpux/Networking/Mail/hypermail-1.02/]

Tools in Action

The NSF-funded **Teacher Enhancement Electronic Community Hall (TEECH) Small Experiment** project established a Hypermail link on its Web page, so that email distributed to the Small Experiment list was automatically posted to the Web.
[http://teech.terc.edu/]
(Newer, related work can be found at [http://teech-lsc.terc.edu].)

Mailing List Servers

Mailing list servers (also called *listservs, list processors,* and *distribution lists*) are programs that allow an administrator to create lists of email addresses

and attach them to a single email address. All messages that are emailed to the list are distributed, again via email, to all subscribers, sometimes by a "moderator" who reads them first (in a "moderated list") and sometimes automatically (in an "unmoderated list"). Some mailing list servers require an administrator to add people to the list. In others, anyone who wishes can automatically subscribe (or un-subscribe) by sending an email message to the program, which resides on a server. Mailing list server programs can provide some security by allowing only authorized users to post to the list or by using a moderator to approve messages before they are posted to the list.

Mailing list servers are an efficient way of sending email to large and/or specific groups and are ideal for disseminating timely information, such as announcements of conferences, pointers to new Web sites of interest, and descriptions of print resources. Anyone on the list can be a source of information. Mailing list servers are well-suited to groups of users who regularly use email and who need to receive information in a timely way. They are less effective for extended or lengthy discussions, because participants may not be able to remember all the previous entries when they respond to a particular item. Another disadvantage is that mailing list servers can be inconvenient for recipients, filling their email in-boxes when they're busy with other things. Two of the most commonly used mailing list server programs are **Majordomo** [http://www.greatcircle.com/majordomo/] and **Listserv** [http://www.lsoft.com/listserv.stm].

Tools in Action

Aelaction is an example of a group that uses a mailing listserv. Aelaction is for teachers, administrators, education faculty, and education researchers—anyone who shares an interest in action research—and is hosted by the Appalachia Educational Laboratory (AEL). Aelaction uses Majordomo residing on a server at AEL. The mailing list has two moderators, who participate mostly by posting notices about events and resources of interest and answering questions from other participants. [http://www.ael.org/]

Web-Based Discussion Systems

One drawback of email and mailing list server discussions is that they organize discussions chronologically. This type of organization is fine for many short discussions or written materials, but most discussions aren't linear and well-organized. One comment can generate ideas on many different tangents. In this case, you may want to organize the discussion by topic. But that doesn't always work well: what if one message in a discussion has ideas that relate to several different parts of the discussion?

Topic-oriented and threaded discussion systems attempt to respond to this problem by keeping an archive and allowing different ways of organizing the discussion. Because of the creative, inventive, and nonlinear nature of human conversation, it's difficult to develop an ideal method of organizing

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records of conversations. Many attempts have been made to address this problem, but the solutions are not perfect; all have advantages and disadvantages, as described below. (We've included descriptions of a few programs; for a comprehensive listing of Web-based discussion systems, go to [http://thinkofit.com/webconf/].)

Topic-Oriented Discussion Systems

A topic-oriented discussion is one in which a single topic and its responses are grouped in a single long message, with the same title or subject description. Users can read the original item and all responses before adding a new response. Such systems rely on the users to respond appropriately or start new items in ways that make the conversation coherent. If they do not, the information may be disorganized. Many also include a mailing list server capability, so when a new item is added to the discussion, an email message notifies all members of the group of the addition. **Web Caucus** and **Web Crossing** are examples of topic-oriented discussion systems.

Tools in Action

The **Empire State Partnerships (ESP) Project** connects cultural institutions and artists with schools to develop interdisciplinary projects that use the arts to support other subjects. One of the project's first tasks was to design a project Web site. To support this effort, participants established a temporary planning Web site with two components: HTML pages with draft documents about the proposed site, and a discussion group, using Web Caucus. **[http://www.esp-artsed.org/]**

Web Caucus puts each item or topic on its own Web page, which includes the initial topic and all its subsequent responses, in sequential order. It also allows the addition of a mailing list server capability to the conferencing system. [http://screenporch.com/]

Web Crossing is a server application that provides online conferencing through Web-based discussion groups and chat rooms. This system uses "folders" to organize discussions and alerts you when new messages are posted. It also allows posting of user pictures to promote online community. [http://webx.lundeen.com/]

Threaded Discussion Systems

The information in a threaded discussion system is organized and displayed hierarchically, so you can see how the messages are related. Each posting (or "article") in a threaded discussion has a topic or subject. Users can comment on the topic, see what others have to say about it, and reply to questions or other people's comments. All of the comments, replies, and discussions on a single topic are collectively called a "thread." The difference between topic oriented and threaded discussions is a matter of format and organization. Usually messages in topic oriented discussions are listed chronologically on a single topic page, messages in threaded

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discussions are organized in an outline format with replies indented and listed directly under the message to which they are a reply.

This is an ideal method for developing an on-topic dialogue, particularly when there are numerous sub-conversations occurring simultaneously. Web pages with information and resources can be linked to the discussion system. One drawback is that if participants respond in the wrong place in the hierarchy, the thread can become garbled. In addition, users who don't log on regularly may miss important announcements and lose the chance to contribute in a timely way. Some systems, like **HyperNews**, can be set to send email to users when new messages are posted.

Tools in Action

Ready SETT Go! was a month-long, online workshop hosted by the National Center to Improve Practice in Special Education Through Technology, Media and Materials (NCIP) at Education Development Center (EDC). Participants used HyperNews, an online conferencing system, to contribute to discussions and post questions. A set of Web pages with information and resources were also linked to the discussion system. EDC now hosts many different workshops in a similar way.
[http://www.edc.org/FSC/NCIP/SETT_Guide.html]

For threaded discussions, you need an application such as **Message Boards**, **HyperNews**, **NetForum**, or **AltaVista Forum** installed on your server.

Message Boards is a Web-based, searchable, hierarchically organized discussion forum. Users can read or reply to messages using any standard browser. The software can be run as a stand-alone application or integrated with other site content. Discussion groups can also be linked to a chat environment, allowing users to switch between applications. When users respond to postings via email, the software automatically opens an email client and inserts an email address in the message.
[http://www.acuity.com/ichat/index.html/]

In the **HyperNews** threaded discussion system, each discussion begins with an introduction and is followed by a series of messages. Each message can have one or more replies, and each participant must decide which message or reply they are responding to—or whether to add a new message to the original discussion topic. Information is organized logically and neatly (as long as participants respond in the appropriate thread) so participants can easily follow a particular strain of conversation. HyperNews requires an administrator knowledgeable in UNIX to set up and administer. It's available for free downloading from the HyperNews site.
[http://www.hypernews.org/HyperNews/get/hypernews.html]

The picture below shows part of a HyperNews discussion thread for general messages from NCIP's Ready SETT Go! online workshop.

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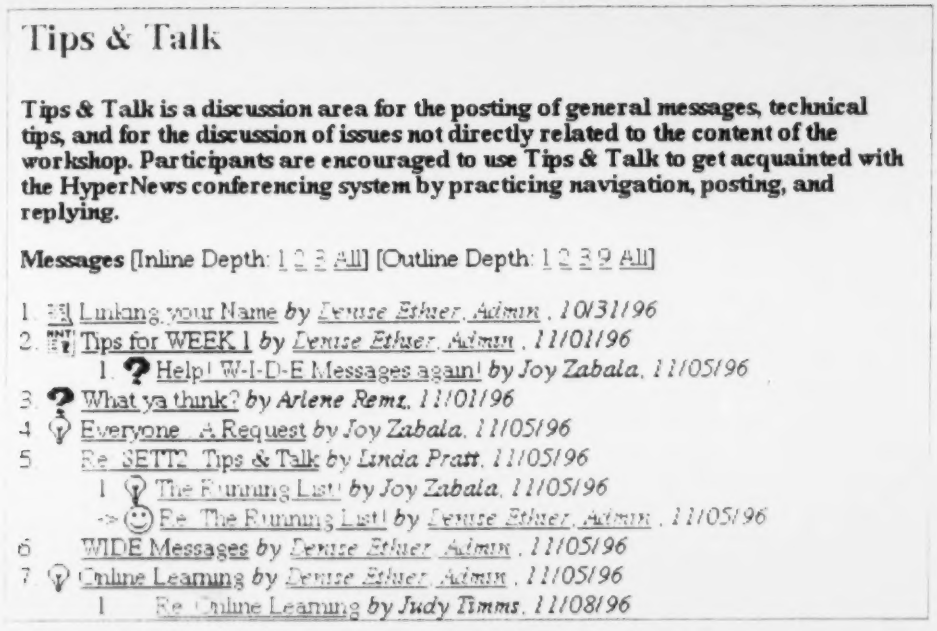

Tips & Talk

Tips & Talk is a discussion area for the posting of general messages, technical tips, and for the discussion of issues not directly related to the content of the workshop. Participants are encouraged to use Tips & Talk to get acquainted with the HyperNews conferencing system by practicing navigation, posting, and replying.

Messages [Inline Depth: 1 2 3 All] [Outline Depth: 1 2 3 9 All]

1. Linking your Name *by Denise Ethier, Admin , 10/31/96*
2. Tips for WEEK 1 *by Denise Ethier, Admin , 11/01/96*
    1. Help! W-I-D-E Messages again! *by Joy Zabala, 11/05/96*
3. What ya think? *by Arlene Remz, 11/01/96*
4. Everyone...A Request *by Joy Zabala, 11/05/96*
5. Re: SETT2 Tips & Talk *by Linda Pratt, 11/05/96*
    1. The Running List! *by Joy Zabala, 11/05/96*
    -> Re: The Running List! *by Denise Ethier, Admin , 11/05/96*
6. WIDE Messages *by Denise Ethier, Admin , 11/05/96*
7. Online Learning *by Denise Ethier, Admin , 11/05/96*
    1. Re: Online Learning *by Judy Timms, 11/08/96*

NetForum is a Web-based threaded discussion system that allows users to create and manage a discussion forum using built-in administrative tools. HTML can be used in messages, therefore allowing links to other sites. The software is available for a free 30-day trial from the NetForum Web site. [http://www.medsch.wisc.edu/netforum/]

AltaVista Forum offers threaded group discussion and document sharing through any standard Web browser. The discussion group administrator can add users or allow them to join groups or "teams" on their own. The administrator places users in groups and grants them access rights. Topics can be deleted only by the administrator or by the user who created the topic. [http://altavista.software.digital.com/]

Tools in Action

The LAB at Brown's **Online Center for School-based Collaboration** uses AltaVista Forum as a discussion and document sharing environment. Much of this site is accessible only to registered participants who work in "teams" with private workspaces for sharing of ideas and work in progress. **[** http://forums.lab.brown.edu/disc/ocsc/dispatch.exe **]**

Integrated Groupware Systems

These systems combine group discussion software with more advanced features, such as document sharing and scheduling. Each participant's email is integrated with a desktop folder containing a full archive of a discussion and other documents relevant to the discussion. Participants usually compose messages offline, and when they log on to send or receive email, all

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of their messages are automatically added to the discussion in each participant's folder and the recipients notified. On the down side, some sophisticated integrated systems require a lot of memory on individual users' hard drives and are relatively costly to maintain and administer.

Tools in Action

The **Brookline Investigations Math Pilot (BIMP)** carried out discussions using the *FirstClass* conferencing system. Participants were recruited via messages posted in a general discussion about the new math curriculum. When the group was formed, they created a separate, smaller, and more private electronic conference. Each participant had a BIMP conference folder on their desktop and access to a separate folder within the conference containing the Brookline Math Learning Objectives.
[http://www.lab.brown.edu/ocsc/papers/case_studies/mass.htm]

. . .

The **International Netcourse Teacher Enhancement Coalition (INTEC)** at the Concord Consortium uses a Lotus Domino discussion server to allow its participants to exchange and view files of virtually any type and build Web-based discussions.
[http://intec.concord.org/]

Integrated groupware tools are ideal for a coherent group, all of whom have similar computers, with common agreement to purchase the same software for every computer. Well-known integrated groupware systems include *FirstClass* and Lotus Notes. It is important to note that as these and other integrated systems become more and more adapted to the Web, issues such as the need for common hardware will become less important.

The **FirstClass** email and conferencing software allows participants to send and receive messages and attach documents to messages, on a local area network or over the Internet. Conferences are shared discussion areas where users can exchange messages and files. Messages can be dispatched to several conferences simultaneously, and responses are automatically added to that particular conference. Desktop folders can contain conferences and resources, such as curriculum documents. Some conferences are open to everyone, while others are restricted to specific groups. *FirstClass* requires a dedicated server, and every user must have a copy of the client software on his or her computer. For a specified amount of time, a complete archive of past messages is maintained in each participant's folder.
[http://www.softarc.com/]

Lotus Notes is a document database that combines messaging, groupware, and Internet access. Its integrated messaging and groupware combines "push/pull" methods of information sharing (that is, users can upload information to the server and retrieve information from it) to give users an efficient means of collaborating. For example, when creating a document for review, a user can send an email message to all reviewers that contains a link to the document. Each reviewer receives the message and simply clicks

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on the document link to launch the document, so that each user has access to the same, most recent version. Mail messages can contain links to any document in a Notes database, including discussions, student profiles, and documentation, Web pages and newsfeeds. Lotus Notes is an extremely flexible program, but currently requires a UNIX or NT programmer to take advantage of its power. A description of its database functions is included below, in the section *Tools for Data Collection and Organization*.
[http://www2.lotus.com/]

Tools for Data Collection and Organization

You will increasingly find Web sites providing a shared database system to which participants can contribute data, which is then organized, sorted, and retrieved for various purposes. This type of activity can range from a simple database of information about individuals participating in an online discussion to a complex scientific endeavor with individuals around the world contributing information.

Tools for Building Databases

Some groupware packages, such as Lotus Notes, have built-in database capabilities; others provide gateways (or connections) to a specific database.

Lotus Notes is a document database that can store and manage collections of data of many types, such as spreadsheets, formatted text, Web pages, graphics, linked or embedded objects, and multimedia objects such as scanned images and faxes, voice/sound, and video. Notes incorporates a full text search engine to allow users to index and search documents based on user queries. It is a hypertext-based system, so that one document can contain a "link" to another document in the database or to documents stored on the World Wide Web. Individual users can create links from one page to another using a single mouse click. [http://www2.lotus.com/]

Many database programs which provide the tools to build your own data management systems now provide easy ways to make these systems accessible through the Web. At the LAB at Brown we use **Filemaker Pro** and **Tango** extensively for management of data via the Web. Filemaker Pro [http://www.filemaker.com/] contains its own built-in mechanism for allowing users to display and enter data via the Web, but we prefer to use Tango [http://www.pervasive.com/] as the scripting environment connecting Web pages to databases because it gives us greater flexibility.

Tools in Action

Portraits of Success, a collaboration between the LAB at Brown University and the National Association for Bilingual Education (NABE), uses a Filemaker/Tango combination to provide access to a growing collection of information about exemplary bilingual education programs. [http://www.lab.brown.edu/public/NABE/portraits.taf]

Tools for Retrieving/Accessing Data from the Internet

There are many Internet search services that return references to USENET newsgroup postings and documents. Users enter keywords or a question and the results are returned, sorted with the best matches at the top. Individual search engines and Web guides include **AltaVista**, **Yahoo!**, **Infoseek**, **WebCrawler**, and **Lycos**. They can be accessed from the Search button on your Web browser. There are also multi-engine search tools, such as **Profusion** [http://profusion.ittc.ukans.edu/] and **Dogpile** [http://www.dogpile.com], that allow you to search all of the main search engines at once.

Listed below are some Web sites that have databases of educational resources, such as lesson plans, curriculum resources, and Internet-based projects. We suggest that you visit some of these sites and try the online tools.

Interactive Sites

Classroom Connect maintains an interactive database of teachers. You may add yourself to the database or search for teachers by grade level, subject area, location, and/or interests. It also provides a listing of education resources on the Internet, a search engine geared to educators, and access to search engines for exploring the entire Internet.
[http://www.classroom.net/]

PedagoNet has a database of learning resource materials and allows users to post their own resources. [http://www.pedagonet.com/]

Teachers Helping Teachers provides lesson plans by subject matter, among other things. [http://www.pacificnet.net/~mandel/]

Teaching & Learning on the WWW is a searchable, dynamic collection of sites where the Web is used for more than just surfing; these are places where teachers are using the Web in the context of their instruction. Users can submit their own links to include in the database.
[http://www.mcli.dist.maricopa.edu/tl/]

Search-Only Sites

The **National School Network (NSN) Resource Exchange** is the network information center for NSN. Designed as a research, support and information sharing facility, the Exchange is host to the contributions of

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NSN partners in the areas of collaborative projects, curriculum, discussions, and research. [http://nsn.bbn.com/]

The **Education World Search Engine** is a database of over 20,000 educational sites that you can search by subject and grade level. [http://www.education-world.com/]

The **Sharing NASA** page is home to a database of NASA's online interactive projects. [http://quest.arc.nasa.gov/interactive/]

Connections+ from the Mid-continent Regional Educational Laboratory (McREL) has a database of Internet resources—lesson plans, activities, curriculum resources—linked with corresponding subject area content standards. [http://www.mcrel.org/resources/plus/index.asp]

The **Educational Resources Information Center (ERIC)** is a national information database of educational resources. [http://www.accesseric.org:81/]

Global SchoolNet's Internet Project Registry lets you search for appropriate online projects to integrate into coursework. [http://www.gsn.org/project/index.html]

Blue Web'n is a searchable database for teachers to find Internet-based instruction. [http://www.kn.pacbell.com/wired/bluewebn/]

TeachNET's site has a database of more than 500 teacher projects from a wide range of curriculum areas from sites around the country. [http://www.teachnet.org/docs.cfm/sharing/]

The **New Jersey Networking Infrastructure in Education (NJNIE)** page has a database of projects that utilize real-time data available from the Internet and collaborative projects. [http://njnie.dl.stevens-tech.edu/curriculum/currichome.html]

www4teachers Premier Tracks is an example of a resource Web page created with Trackstar software. Trackstar is a Web-based tool designed to help teachers create Web-enhanced curriculum by creating lists of annotated Web links. The Premier Tracks page is a small set of featured "tracks" which changes regularly. [http://4teachers.org/premier/]

Tools for Sharing Documents

Documents can be shared for different reasons: you may want to post a document so others can read or review it, or a group may want to co-edit a document. Several technologies support this type of collaboration.

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including group editing tools and Web page creation tools. Shared whiteboards can be used for synchronous discussion of shared documents; this technology is described in the next section, "Tools for Synchronous Communication."

Group editing tools allow multiple users to access and update the same document, while keeping a record of all changes made to the original. When more than one person is working on a document, it's important that everyone have access to the current version, including the most recent notes and edits. It's also necessary to have a way of protecting the document (so that earlier versions aren't destroyed) and to deal with the possible conflicts that can arise when two or more people edit a document at the same time. This feature is called *version control*. Many group editing tools have access control, meaning some members have the authority to make changes, while others are only permitted to write notes with suggestions to the primary writers. Others have even more limited authority and may only read the document. Another useful feature of group editing tools is merging, which allows several versions or files to be merged into one.

Two examples of Web-based group editing tools are SamePage and Redline. Tools that can be used to co-develop Web pages (as a means of posting documents to be shared) are Claris Homepage and Microsoft's FrontPage. Another new tool specially developed for telementoring—MentorCenter—allows teachers, students, and mentors to collaborate on student work. These tools are all described below.

The Web-based **SamePage** group editing software program allows participants to share a file and write and co-edit simultaneously. The original document is archived so that contributors have a record of how the work is evolving. One feature of SamePage is access control. [http://www.accentuate.com/products/samepage.html]

Redline is a collaborative Web-based writing tool that allows an author to post a document as a plain text file and gather comments from a group of reviewers. The author can then import the comments into a word processor and edit the document. Current comments are all displayed in the margins of a Web-based document. [http://redline.ifactory.com/]

Claris Homepage [http://www.clarishomepage.com/] and **Microsoft FrontPage** [http://www.microsoft.com/products/prodref/571_ov.htm] are used for creating Web pages. They are not specifically designed as groupware, but may be adaptable so that participants can share the Web pages they develop. Homepage, a cross platform program, and FrontPage, with both a cross platform and PC version, allow users to create Web pages without having to know HyperText Markup Language (HTML), the programming language in which Web pages are written. Users create documents as they would with standard word processing software, and the programs insert HTML commands into text and graphics to produce

formatted text, graphic images, and clickable links in the Web document. The program allows you to send the document to a Web server so that the HTML document can be read using a Web browser. These tools make it easy for the technology novice to write Web pages and share information on them. For example, one moderator developed a Web site that allowed her group to share, view, and comment on student work.

MentorCenter is a Web-based telementoring program, developed by the Learning Systems and Technologies group at BBN Technologies, that connects teachers, students, and volunteer mentors. [http://mentorcenter.bbn.com/] The teacher acts as the coach, guiding both the student and the mentor, who is an adult community member. From their workplace or home, at any time of the day, mentors help students on a variety of school projects ranging from writing to composing music to drawing. Teachers post the assignment on the Web site. Students complete the assignment and post it in MentorCenter. The program automatically notifies the mentor through email that there is work waiting for review. After the mentor has responded, the student can do a new draft incorporating the mentor's comments. All along the way, the teacher is able to keep track of the interactions and the progress of each assignment for each child. The program was originally designed for students and adult mentors, but is being adapted for other educational uses, such as parent involvement. It is available for use in school and research projects through Boston College. [http://learning.bc.edu/]

Tools for Synchronous Communication

Some people believe that the immediacy of synchronous communication improves the quality of an online collaboration. Three technologies that support such interaction are online chat, videoconferencing, and shared whiteboards.

Chat

To participate in most "public" chat rooms on the World Wide Web, all you need is a Web browser and in most cases the appropriate plug-ins. The problem with these types of chat groups is that they may not focus on the topic of interest, and anyone can participate.

An alternative to such public groups is to find a service that supports users' ability to create private chat rooms on the fly or to sponsor a "private" chat session. To do so requires that the event's sponsor purchase and install chat server software on a server. People participating in such a private chat need to install the corresponding client software on their computers. Most of this software is available for free downloading from the Web. Most chat clients have at least three windows—the chat box, where the discussion scrolls past,

a text box where you enter your own messages, and a box containing a list of people who are in the chat room with you.

Online services that provide chat rooms, such as America Online and Prodigy, use their own proprietary software.

ichat is a Web-based tool that allows all participants to interact with other users in chat-enabled Web pages. On these pages, the ichat client opens a frame called the chat window, where the chat session is displayed. Users can join the conversation by typing what they want to say. They can also scroll back and review what has been written during a session, and view graphics in a separate window. To participate in an ichat chat, you must have the ichat client software installed on your computer and you must log on to a server running ichat. The client software is free and may be downloaded from the ichat Web site. [http://www.ichat.com]

Tools in Action

The New American Schools **Sharing Our Stories** online course used ichat to hold weekly meetings to discuss course material. The moderators then used the software's archiving capability to post each session on the course Web site, so participants could review what was said. [http://www.naschools.org/finals/]

Videoconferencing

With a camera attached to their computers, participants view one another as the discussion occurs. Videoconferencing ranges greatly in setup and quality, depending on the manner of reception. Quality varies depending upon size and type of your network connection, which shortens or lengthens the lag between audio and accompanying video.

Some forms of videoconferencing are designed for computer desktop use (CU-SeeMe), others for use in a central studio or with special dedicated phone connections (PictureTel). They range from costly proprietary systems to inexpensive shareware and freeware. Desktop videoconferencing frequently provides a text window, or some other form of shared workspace, in addition to voice and picture. For example, CU-SeeMe provides a text chat function alongside the videoconferencing.

Tools in Action

National School Network (NSN) sponsored a **Science Online** event in May 1997 for teachers from New York, with guest speakers from Illinois and Indiana. The session included a CU-SeeMe session to discuss using the Internet for science education, followed by two chat sessions on taking science exhibits online and leading virtual expeditions. [http://nsn.bbn.com/science_online/]

CU-SeeMe desktop videoconferencing software for real-time conferencing was originally developed at Cornell University. A free version of this software can be downloaded from the Cornell Web site. A commercial version known as Enhanced CU-SeeMe is available from White Pine Software. [http://www.wpine.com/]

Microsoft's NetMeeting (for Windows 95 and Windows NT) will let you communicate with both audio and video, exchange graphics on an electronic whiteboard, transfer files, use a text-based chat program, and collaborate on many Windows-based applications.
[http://www.microsoft.com/products/prodref/113_ov.htm]

Intel's **Proshare® Video System 500** desktop videoconferencing kit includes a PC interface card, a camera, microphone, and audio and video software and provides for videoconferencing either over the Internet or via dedicated ISDN phone lines.
[http://www.intel.com/proshare/conferencing/products/pvsdata.htm]

Shared Whiteboards

Like having a whiteboard at a face-to-face meeting, shared whiteboards allow a document or image to be viewed simultaneously by two or more people in different locations. All participants can annotate the document using the drawing or text capabilities of the whiteboard software. Most shared whiteboard programs use different colors to indicate whose annotations are whose.

Netscape Conference allows one or more users to hold an audio conference over the Web, share a whiteboard, or conduct a text-based discussion.
[http://home.netscape.com/eng/mozilla/4.0/handbook/cont.htm#CONF_MAIN_ABOUT]

Rendezvous provides simultaneous text sessions, drawing on common canvas, file and document exchange among conference participants, and screen and image sharing. [http://rendezvous.visualtek.com/]

TeamWave Workplace is an integrated groupware program that combines shared whiteboards, chat rooms, and customizable groupware tools that allow synchronous or asynchronous communication. Unlike the other two examples cited here, this environment uses special client software rather than making its features available through your Web browser.
[http://www.teamwave.com/]

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Tools for Online Courses

One approach to online courses is to use a variety of tools, many of which are described elsewhere in this chapter. These include discussion groups, mailing list servers, databases, shared whiteboards, and videoconferencing.

For example, the NCIP Ready SETT Go! online workshop used a combination of HyperNews threaded discussions and Web pages to share background materials and a framework document that participants were developing.

The New American Schools Sharing Our Stories course used chat sessions for weekly meetings, Hypernews threaded discussion groups for reflecting on the meetings, and Web pages for posting information about participants and the course. It also conducted one class using CU-SeeMe videoconferencing and used ichat for text-based real-time meetings.

Other courses, such as those offered by INTEC (International Netcourse Teacher Enhancement Coalition), use a single program, such as the Lotus Domino server, which allows participants to exchange and view files of all types and build Web-based discussions.

Tools in Action

National School Network (NSN) partnered with the **Online Internet Institute** to support an electronic institute where master teachers telementored teachers across the country. Teachers used NSN's MentorCenter™ and electronic discussion tools to share their ideas, insights, learning, and experience over the network to improve their practice. Working with online mentors, they analyzed student work and their own classrooms, identified qualities of effective instructional strategies, presented their ideas to others in the group, and discussed reflective teaching practice. [http://mentorcenter.bbn.com/]

Another approach to online courses is to use tools that have been specifically designed to develop and carry them out.

The Virtual High School (VHS) cooperative at Concord Consortium [http://vhs.concord.org/] uses the Lotus Notes-based **LearningSpace** to construct its online high school courses.
[http://www.lotus.com/home.nsf/welcome/learnspace/]

WebCT is another such tool. Developed at the University of British Columbia, WebCT combines many of the tools we have been describing here (e.g., conferencing and document sharing) into a package intended for creation of online courses by non-programmers.
[http://homebrew.cs.ubc.ca/webct/]

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On Your Own:
➢Collaborative Web Sites
Publications
About LAB at Brown
About NSN
About TEECH

5. On Your Own: Resources for Electronic Collaboration

We have compiled a variety of resources to support your involvement in electronic collaboration. This chapter is a bibliography and reference list. It provides examples of collaborative Web sites that are worth checking out, includes a bibliography on moderating collaborations, tells you how to get the most current information about some of the technologies we've described in the guide, and provides some background on the Northeast and Islands Regional Educational Laboratory at Brown University (LAB), the National School Network (NSN), and on the Teacher Enhancement Electronic Community Hall (TEECH).

Collaborative Web Sites

Clearly, the sites listed here are just a few of those on the World Wide Web. We encourage you to visit them and to search for your own resources.

Discussion Groups

Some discussion groups directly related to electronic collaboration are listed below. To find others, check out searchable Web directories such as **Reference.com** [http://www.reference.com/] or the **Forum Finder** [http://www.forumone.com/], which searches over 150,000 Web forum discussions.

The **Guide to Software and Techniques for Managing Web-based Discussions** provides a listing of products and resources about online discussion groups. [http://www.ForumOne.com/software.htm]

The **Math Forum** at Swarthmore is a center for teachers, students, researchers, and parents who have an interest in mathematics education. A major component of this center is their discussion forums. [http://forum.swarthmore.edu/discussions.html]

Center for Innovative Learning Technologies is an NSF-funded collaboration focused on emerging technologies and their role in K-14 education. Online collaboration is itself one of the themes of their work.

but they also host a discussion environment for those interested in the main themes of their work. [http://cilt.org/]

LabNet Online was one of the first online professional communities for educators. In 1989, there were 130 math and science teachers; by 1998 there were 1,500 participants, including technology specialists. They met online to support one another and study new teaching strategies, network, discuss and reflect on their practices, and share information. Discussions included biology/life sciences, chemistry, geology/earth science, and physics. There was also a science library and a technical help hotline. This site is no longer active. [http://labnet.terc.edu/]

Liszt Select is a directory of education mailing lists.
[http://www.liszt.com/select/Education/]

At **MediaMOO**, every Tuesday night for the last two years, 50 or so teachers interested in discussing media issues log on for a two-hour discussion at a designated time led by a moderator. MediaMoo's participants come from a national organization of writing teachers. Note: This is a telnet site; typing the address into your browser will get you to the site, provided you have telnet software installed on your computer and your browser is configured to use it. [telnet://mediamoo.media.mit.edu:8888/]

TENET is a statewide network that provides access, support, and resources for educators across Texas. TENET uses communications technologies to support teacher adoption of reform initiatives. Members of the TENET network can participate in public discussion forums about educational issues or create private forums, access and contribute to curriculum resources, join, propose, or gather information about collaborative projects, and receive mentoring in technology use. The discussion group function on this site is called the Educator's Forum. [http://www.tenet.edu/]

Data Collection and Organization

Webliographer is a Web-based tool allowing users to construct an annotated list of selected Web sites.
[http://relax.ltc.vanderbilt.edu/webliographer/]

The **Classroom Connect** site organizes URL resources for teachers by subject area and grade level from K-12. It also maintains a database of teachers. You may add yourself to the database or search for teachers by grade level, subject area, location, and interests.
[http://www.classroom.net/]

Global Campus is a multimedia database containing educational materials such as images, sounds, text, and video. [http://www.csulb.edu/gc/]

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See the section on "Tools for Data Collection and Organization" in Chapter 4 for additional relevant Web sites.

Document Sharing

Sites offering information about Web-based tools for document sharing and group editing are described in Chapter 4, in the section "Tools for Document Sharing."

Synchronous Communication

The **PedagoNet** site offers live chats for elementary, secondary, and college teachers. [http://www.pedagonet.com/]

The **English as a Second Language Chat Center** offers chats for ESL/EFL students and teachers from around the world.
[http://www.eslcafe.com/chat/chatpro.cgi]

The **Teacher's Lounge** at the WebChat site connects teachers from around the world. A virtual teacher's aide is available to answer questions and distribute "Chat Cheat Sheets." [http://chat.go.com/]

The **WebUniversity Interactive Educational Network** offers live chat, tutoring, and instruction to students and educators in math, science, languages, and the arts. [http://www.web-u.com/]

The "**Ask the Scientist**" **CU-SeeMe Cybercasts** page, sponsored by the Department of Space Physics and Astronomy at Rice University, hosts scheduled videoconferences with scientists. Every week, a scientist is available for an hour over the Internet to answer questions about exciting new discoveries. [http://space.rice.edu/hmns/ask.html]

The **Global SchoolNet's CU-SeeMe Schools** page is a resource for educators who want to learn more about videoconferencing and CU-SeeMe. GSN also hosts the CU-SeeMe Schools videoconferencing mailing list. [http://www.gsn.org/cu/index.html]

PacBell's **Videoconferencing in the Classroom and Library** Web page is designed to help teachers, librarians, and students use videoconferencing for interactive learning and collaboration.
[http://www.kn.pacbell.com/wired/vidconf/]

Online Courses and Workshops

The **Mathematics Learning Forums** offer college credit to teachers who want to learn about the new national math standards. Developed by Education Development Center and the Bank Street School of Education,

teacher-students take a course on a specific topic ranging from "Assessing Students Through Focused Observations" to "Teaching Probability" from a master teacher. The master assigns activities and readings which must be completed out of "class" and then discussed online.
[http://www.edc.org/CCT/mlf/MLF.html]

The **Ready SETT Go!** Virtual team meeting site provides information about a four-week workshop organized around the SETT Framework, which stands for Student, Environments, Tasks, and Tools. It is a collaborative decision-making tool that guides teachers, specialists, parents, and the student to select assistive technology. This online workshop is designed for teachers and specialists who have responsibility for the selection of assistive technology for students with disabilities.
[http://www.edc.org/FSC/NCIP/SETT_Guide.html]

The **International Netcourse Teacher Enhancement Coalition (INTEC)**, sponsored by the Concord Consortium, hosts courses for teachers to support their use of student investigations in mathematics and science. Online study groups are one component of these workshops.
[http://intec.concord.org/]

The **National Teachers Enhancement Network (NTEN)** provides science and mathematics courses to teachers for graduate credit. Teachers participate in both private and group discussions online.
[http://btc.montana.edu/nten/]

Other Active Collaborative Environments

Some resources don't fit into individual categories because they have many or all of the characteristics identified above. They are full-scale environments that allow teachers to collaborate in a multitude of different ways under one "roof." We list a few such sites below.

The **National School Network (NSN)** is a partnership of schools, museums, informal education centers, universities, research and development groups, corporations, small businesses, publishers, network service providers, and members of communities working on building state-of-the-art applications for networking in education. The NSN Resource Exchange serves as a repository for NSN Testbed research and host to members' projects, pointers, and collaborations. [http://nsn.bbn.com/]

The **Co-NECT Exchange** site supports Co-NECT (Cooperative Networked Educational Community For Tomorrow) teachers. Co-NECT Schools is a comprehensive plan designed by BBN as part of the New American Schools initiative that helps school districts to restructure their educational programs using technology and professional development. The Co-NECT Exchange is a resource for teachers, steering them to the best

Web sites for their work. It features a question of the month which surveys educators on current issues in technology and education reform. [http://www.co-nect.com/]

TeachNET provides resources for teachers such as curriculum sharing guides and a Let's Talk bulletin board for teachers to share ideas and solicit information from their colleagues. [http://www.teachnet.org/]

The **Teacher Enhancement Electronic Community Hall (TEECH)** is an electronic community set up to foster collaboration among leaders in teacher development. It provides resources on professional development, standards and frameworks, systemic reform, and other areas of interest to educators. [http://teech.terc.edu/]

The **Well Connected Educator** is a Web site where more than 150 K-12 educators publish stories about what strategies work—and don't work—in their classrooms, schools, or districts. The WCE also has an online forum that raises timely issues for public discussion, and a teachers' Web site "hotlist" with comments about the merits of the site and how it connects to the curriculum. [http://www.techlearning.com/index2.html]

Described as a "new online teacher community concept for the next generation of Internet technology," **Tapped In** resembles a conference center you would find in the real world, with meeting rooms to discuss educational issues, work rooms (like lounges where you would take a break and chat), and offices to do personal work. The meeting rooms are equipped with whiteboards, which allow participants to brainstorm, draw, and write their thoughts so others can view, comment, and edit either at the same time or separately. Teachers in different classrooms or from home can pull up the same document on their computers and work on it collectively. The rooms are also linked to the myriad of resources and Web sites offered on the Internet, so that teachers can visit them and work with this new information together. [http://www.tappedin.sri.com/]

Publications

Online Articles

Bentley, R., Horstmann, T., Sikkel, K., & Trevor, J. (n. d.). Supporting collaborative information sharing with the World Wide Web: The BSCW shared workspace system. German National Research Centre for Information Technology (GMD FIT.CSCW) Schloß Birlinghoven. [http://www.w3.org/pub/Conferences/WWW4/Papers/151/]

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Collins, M., & Bane, Z. (1995). Facilitating interaction in computer mediated online courses.
[http://star.ucc.nau.edu/~mauri/moderate/flcc.html]

DiMauro, V., & Gal, S. (1994). The use of telecommunications for reflective discourse of science teacher leaders. *Journal of Science Education and Technology 3*, (2).
[http://web1.terc.edu/papers/labnet/Articles/Reflective/Reflective.html]

DiMauro, V., & Jacobs G. (1995). Collaborative electronic network building. *The Journal of Computers in Math and Science Teaching* (February).
[http://web1.terc.edu/papers/labnet/Articles/Collaborative/Collaborative.html]

——— (1995, April). Filling in the professional gaps: Active teacher participation on a telecommunications network. Paper presented at the American Educational Research Association Annual Meeting, San Francisco, CA. [http://web1.terc.edu/papers/labnet/Articles/Gaps.html]

Goldman, M. & Laserna, C. (1996.) Building school community relationships. National School Network Testbed Research.
[http://nsn.bbn.com/resources/research/buildsch_com.html]

Harris, J. Articles from her *Mining the Internet* column. These articles focus on online environments. [http://www.ed.uiuc.edu/Mining/]

Hunter, B. (1996). Internetworking and educational reform: The National School Network Testbed.
[http://nsn.bbn.com/resources/research/hunter.html]

——— (n.d). Technologies and Standards 2000: Some questions. Draft prepared for NCTM Commission on Future of the Standards and the Writing Group for Standards 2000.
[http://copernicus.bbn.com/edtech/publications/Technology.Standards/]

Internet Events Cookbook: A practical guide to planning for, participating in, and sponsoring Internet events. BBN Technologies, in press.
[http://nsn.bbn.com/event_cookbook/cookbook_events.html]

Jacobs, G., & DiMauro, V. (1995). Active readers—What benefits do they gain from an educational telecommunications network? Paper presented at the Annual Meeting of the International Conference on Technology and Education, Orlando, FL. [http://web1.terc.edu/papers/labnet/Articles/Active.html]

Levin, J. A. (1995). Education on the networks of today and tomorrow: The integration of computer-supported cooperative learning and work. University of Illinois.
[http://www.cica.indiana.edu/cscl95/outlook/08_Levin.html]

BEST COPY AVAILABLE

Muscella, D., & DiMauro, V. (1995). LabNet: An electronic forum to support teaching science.
[http://web1.terc.edu/papers/labnet/Articles/SITE.html]

——— (1995). Talking about science: The case of an electronic conversation.
[http://web1.terc.edu/papers/labnet/Articles/Method/Method.html]

Pattison-Gordon, L. (1997). Best practices in collaborative technology. Working paper for the Collaboration for Reform group, LAB at Brown/BBN.
[http://www.lab.brown.edu/ocsc/papers/Networked.collab.content.html]

Ravitz, J. (1995, November). Building collaborative online communities for K-12. Paper presented at the Midcontinent Institute's Fourth Annual Innovations in Education Conference, Minot, N.D.
[http://www.npac.syr.edu/users/jravitz/Ravitz_Paper_8_95.html]

Riel, M. (1996). The Internet: A land to settle rather than an ocean to surf and a new 'place' for school reform through community development.
[http://www.gsn.org/teach/articles/netasplace.html]

——— (1996). The Internet and the humanities: The human side of networking. [http://www.ed.gov/Technology/Futures/riel.html]

——— (1993). Learning circles: Virtual communities for elementary and secondary schools. [http://www.ed.uiuc.edu/Guidelines/Riel-93.html]

Watt, D.L., Carter, R., Franklin, D., Haddad, N., & Pervane, Z. (1998). Choosing and evaluating groupware for Net-based collaboration.
[http://www.lab.brown.edu/ocsc/Tools.html]

Print

Grudin, J. (1994). Groupware and social dynamics: Eight challenges for developers. *Communications of the ACM 37* (1): 92-105.

Hunter, B. (1990). Computer-mediated communications support for teacher collaborations: Researching new contexts for both teaching and learning. *Educational Technology 30* (10): 46-49.

Koufman-Frederick, A. (1997). Electronic collaboration for professional development: Designing the learning environment. (Qualitative research report, proposal for Ph.D. dissertation, Boston College.)

Riel, M. (1992). A functional analysis of educational telecomputing: A case study of learning circles: AT&T Learning Network. *Interactive Learning Environments 2* (1).

——— (1989). Four models of educational telecommunications: Connections to the future. *Education and Computing* 5: 261-274.

Riel, M., & Levin, J. (1990). Building electronic communities: Success and failure in computer networking. *Instructional Science 19*: 145-169.

West, M.M., & McSwiney, E. (1989). Computer networking for collegial exchange among teachers: A summary of findings and recommendations. Cambridge, Massachusetts: Educational Technology Center, Harvard Graduate School of Education.

Moderation Guides

Burton, W. SEEDS: CMC practice: Facilitating the online experience. University College of the Fraser Valley.
[http://malun1.mala.bc.ca/seeds/cmc/practice.html]

Guidelines for educational uses of networks. A collection of guides to planning networked projects, courses, etc. that is available from Learning Resources Server, University of Illinois.
[http://lrs.ed.uiuc.edu/Guidelines/]

Kimball, L. A variety of her writings on network based collaboration.
[http://www.tmn.com/-lisa/]

_____. Ten key elements to manage to make virtual teams more effective.
[http://www.tmn.com/-lisa/teams/ten.htm]

Resources for moderators and facilitators of online discussion. A Web site of resources for moderators of online discussions.
[http://star.ucc.nau.edu/-mauri/moderators.html]

Spitzer, W., Weddin, K., & DiMauro, V. Fostering reflective dialogue for teacher professional development.
[http://www.terc.edu/papers/labnet/Guide/Fostering_Refl_Dialogues.html]

About the Northeast and Islands Regional Educational Laboratory at Brown University

The mission of the Northeast and Islands Regional Educational Laboratory at Brown University is to improve teaching and learning and advance systemic school improvement by building capacity for reform and by building strategic alliances with key members of the region's education and policymaking community.

The LAB at Brown University, a program of The Education Alliance for Equity and Excellence in the Nation's Schools at Brown University , is one of ten federally supported educational laboratories in the country. The LAB develops educational products and services for school administrators, policymakers, teachers, and parents in its nine-state/island region encompassing New England, New York, Puerto Rico, and the Virgin Islands.

Information about LAB programs and services is available by contacting:

LAB at Brown University
The Education Alliance
222 Richmond Street, Suite 300
Providence, RI 02903-4226
Phone: 800-521-9550
Email: info@lab.brown.edu
Web: http://www.lab.brown.edu/
Fax: 401-421-7650

Information about the Online Collaboration for Reform Project is available by contacting:

The LAB at Brown Online Collaboration for Reform Project
Richard Carter
Lesley College
29 Everett Street
Cambridge, MA 02138
Phone: 617-349-8156
Email: rcarter@lesley.edu
Web: http://www.lab.brown.edu/ocsc/
Fax: 617-349-8169

On Your Own:
Collaborative Web Sites
Publications
About LAB at Brown
About NSN
About TEECH

About the National School Network

The National School Network (NSN) is a nationwide group of educators collaborating to advance educational reforms through internetworking at local, state and national levels. Funded from 1992 to 1998 by the National Science Foundation, the network was developed by BBN Technologies at GTE Internetworking, and operated by its Learning Systems & Technologies group. During the fall of 1998 the National School Network moved its home from BBN/GTE Internetworking to Boston College. To find out about the current status of the NSN contact Melanie Goldman or Beverly Hunter at Boston College (see contact information below).

NSN has over 500 participating community members, among them more than 250 schools and districts across the U.S. In addition, the total group includes museums, libraries, research institutions, small businesses, and corporations.

The NSN Web site includes the NSN library assembled from three years of NSF-funded research and practice. This includes papers, surveys, and the Exchange Desks—resources and know-how on networking, professional development, assessment and standards, and more.

Information about the National School Network is available by contacting:

The National School Network
Melanie Goldman
Learning Communities Research Group
School of Education
202 Stadium Offices
Boston College
Chestnut Hill, MA 02467
Phone: 617 552 6223
Email: goldmame@bc.edu
Web: http://nsn.bbn.com/
Fax: 617-552-1474

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- About LAB at Brown
- About NSN
- ➢About TEECH

About TEECH - Teacher Enhancement Electronic Community Hall

TEECH was an electronic community set up to foster collaboration among leaders in teacher development. Housed at TERC, this project was funded by the National Science Foundation from 1995 to 1998. TEECH was available to principal investigators (PIs) of all teacher enhancement projects.

Information about the TEECH project is available by contacting:

TERC
2067 Massachusetts Avenue
Cambridge, MA 02140
Contact: Joni Falk
Phone: 617-547-0430
Email: Joni_Falk@terc.edu
Web: http://teech.terc.edu/

For Information on BBN's TEECH Projects In Profile contact:

Beverly Hunter
Learning Communities Research Group
School of Education
202 Stadium Offices
Boston College
Chestnut Hill, MA 02467
Phone: 617-552-6226
Email: hunterb@bc.edu
Web: http://learning.bc.edu/
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See the section on "Tools for Data Collection and Organization" in Chapter 4 for a[illegible]ional relevant Web sites.

Documen[illegible]haring

Sites offering i[illegible]tion about Web-based tools for document sharing and group editing [illegible]cribed in Chapter 4, in the section "Tools for Document Sh[illegible]

Synchronc[illegible]Communication

The **PedagoNe**[illegible]fers live chats for elementary, secondary, and college te[illegible]ners. [http:[illegible]pedagonet.com/]

The **English as a Sec[illegible]nd Language Chat Center** offers chats for ESL/EFL students and teachers from around the world.
[http://www.eslcafe.com/chat/chatpro.cgi]

The **Teacher's Lounge** at the WebChat site connects teachers from around the world. A virtual teacher's aide is available to answer questions and distribute "Chat Cheat Sheets." [http://chat.go.com/]

The **WebUniversity Interactive Educational Network** offers live chat, tutoring, and instruction to students and educators in math, science, languages, and the arts. [http://www.web-u.com/]

The **"Ask the Scientist" CU-SeeMe Cybercasts** page, sponsored by the Department of Space Physics and Astronomy at Rice University, hosts scheduled videoconfer[illegible]ces with scientists. Every week, a scientist is available for an hour [illegible]r the Internet to answer questions about exciting new discoveries. [http[illegible]space.rice.edu/hmns/ask.html]

The **Global SchoolNet s CU-SeeMe Schools** page is a resource for educators who want to learn more about videoconferencing and CU-SeeMe. GSN also hosts the CU-SeeMe Schools videoconferencing mailing list. [http://www.gsn.org/cu/index.html]

PacBell's **Videoconferencing in the Classroom and Library** Web page is designed to help teachers, librarians, and students use videoconferencing for interactive learning and collaboration.
[http://www.kn.pacbell.com/wired/vidconf/]

Online Courses and Workshops

The **Mathematics Learning Forums** offer college credit to teachers who want to learn about the new national math standards. Developed by Education Development Center and the Bank Street School of Education,

teacher-students take a course on a specific topic ranging from "Assessing Students Through Focused Observations" to "Teaching Probability" from a master teacher. The master assigns activities and readings which must be completed out of "class" and then discussed online.
[http://www.edc.org/CCT/mlf/MLF.html]

The **Ready SETT Go!** Virtual team meeting site provides information about a four-week workshop organized around the SETT Framework, which stands for Student, Environments, Tasks, and Tools. It is a collaborative decision-making tool that guides teachers, specialists, parents, and the student to select assistive technology. This online workshop is designed for teachers and specialists who have responsibility for the selection of assistive technology for students with disabilities.
[http://www.edc.org/FSC/NCIP/SETT_Guide.html]

The **International Netcourse Teacher Enhancement Coalition (INTEC)**, sponsored by the Concord Consortium, hosts courses for teachers to support their use of student investigations in mathematics and science. Online study groups are one component of these workshops.
[http://intec.concord.org/]

The **National Teachers Enhancement Network (NTEN)** provides science and mathematics courses to teachers for graduate credit. Teachers participate in both private and group discussions online.
[http://btc.montana.edu/nten/]

Other Active Collaborative Environments

Some resources don't fit into individual categories because they have many or all of the characteristics identified above. They are full-scale environments that allow teachers to collaborate in a multitude of different ways under one "roof." We list a few such sites below.

The **National School Network (NSN)** is a partnership of schools, museums, informal education centers, universities, research and development groups, corporations, small businesses, publishers, network service providers, and members of communities working on building state-of-the-art applications for networking in education. The NSN Resource Exchange serves as a repository for NSN Testbed research and host to members' projects, pointers, and collaborations. [http://nsn.bbn.com/]

The **Co-NECT Exchange** site supports Co-NECT (Cooperative Networked Educational Community For Tomorrow) teachers. Co-NECT Schools is a comprehensive plan designed by BBN as part of the New American Schools initiative that helps school districts to restructure their educational programs using technology and professional development. The Co-NECT Exchange is a resource for teachers, steering them to the best

Web sites for their work. It features a question of the month which surveys educators on current issues in technology and education reform. [http://www.co-nect.com/]

TeachNET provides resources for teachers such as curriculum sharing guides and a Let's Talk bulletin board for teachers to share ideas and solicit information from their colleagues. [http://www.teachnet.org/]

The **Teacher Enhancement Electronic Community Hall (TEECH)** is an electronic community set up to foster collaboration among leaders in teacher development. It provides resources on professional development, standards and frameworks, systemic reform, and other areas of interest to educators. [http://teech.terc.edu/]

The **Well Connected Educator** is a Web site where more than 150 K-12 educators publish stories about what strategies work—and don't work—in their classrooms, schools, or districts. The WCE also has an online forum that raises timely issues for public discussion, and a teachers' Web site "hotlist" with comments about the merits of the site and how it connects to the curriculum. [http://www.techlearning.com/index2.html]

Described as a "new online teacher community concept for the next generation of Internet technology," **Tapped In** resembles a conference center you would find in the real world, with meeting rooms to discuss educational issues, work rooms (like lounges where you would take a break and chat), and offices to do personal work. The meeting rooms are equipped with whiteboards, which allow participants to brainstorm, draw, and write their thoughts so others can view, comment, and edit either at the same time or separately. Teachers in different classrooms or from home can pull up the same document on their computers and work on it collectively. The rooms are also linked to the myriad of resources and Web sites offered on the Internet, so that teachers can visit them and work with this new information together. [http://www.tappedin.sri.com/]

Publications

Online Articles

Bentley, R., Horstmann, T., Sikkel, K., & Trevor, J. (n. d.). Supporting collaborative information sharing with the World Wide Web: The BSCW shared workspace system. German National Research Centre for Information Technology (GMD FIT.CSCW) Schloß Birlinghoven. [http://www.w3.org/pub/Conferences/WWW4/Papers/151/]

Collins, M., & Bane, Z. (1995). Facilitating interaction in computer mediated online courses.
[http://star.ucc.nau.edu/~mauri/moderate/flcc.html]

DiMauro, V., & Gal, S. (1994). The use of telecommunications for reflective discourse of science teacher leaders. *Journal of Science Education and Technology 3*, (2).
[http://web1.terc.edu/papers/labnet/Articles/Reflective/Reflective.html]

DiMauro, V., & Jacobs G. (1995). Collaborative electronic network building. *The Journal of Computers in Math and Science Teaching* (February).
[http://web1.terc.edu/papers/labnet/Articles/Collaborative/Collaborative.html]

——— (1995, April). Filling in the professional gaps: Active teacher participation on a telecommunications network. Paper presented at the American Educational Research Association Annual Meeting, San Francisco, CA. [http://web1.terc.edu/papers/labnet/Articles/Gaps.html]

Goldman, M. & Laserna, C. (1996.) Building school community relationships. National School Network Testbed Research.
[http://nsn.bbn.com/resources/research/buildsch_com.html]

Harris, J. Articles from her *Mining the Internet* column. These articles focus on online environments. [http://www.ed.uiuc.edu/Mining/]

Hunter, B. (1996). Internetworking and educational reform: The National School Network Testbed.
[http://nsn.bbn.com/resources/research/hunter.html]

——— (n.d). Technologies and Standards 2000: Some questions. Draft prepared for NCTM Commission on Future of the Standards and the Writing Group for Standards 2000.
[http://copernicus.bbn.com/edtech/publications/Technology.Standards/]

Internet Events Cookbook: A practical guide to planning for, participating in, and sponsoring Internet events. BBN Technologies, in press.
[http://nsn.bbn.com/event_cookbook/cookbook_events.html]

Jacobs, G., & DiMauro, V. (1995). Active readers—What benefits do they gain from an educational telecommunications network? Paper presented at the Annual Meeting of the International Conference on Technology and Education, Orlando, FL. [http://web1.terc.edu/papers/labnet/Articles/Active.html]

Levin, J. A. (1995). Education on the networks of today and tomorrow: The integration of computer-supported cooperative learning and work. University of Illinois.
[http://www.cica.indiana.edu/cscl95/outlook/08_Levin.html]

Muscella, D., & DiMauro, V. (1995). LabNet: An electronic forum to support teaching science.
[http://web1.terc.edu/papers/labnet/Articles/SITE.html]

——— (1995). Talking about science: The case of an electronic conversation.
[http://web1.terc.edu/papers/labnet/Articles/Method/Method.html]

Pattison-Gordon, L. (1997). Best practices in collaborative technology. Working paper for the Collaboration for Reform group, LAB at Brown/BBN.
[http://www.lab.brown.edu/ocsc/papers/Networked.collab.content.html]

Ravitz, J. (1995, November). Building collaborative online communities for K-12. Paper presented at the Midcontinent Institute's Fourth Annual Innovations in Education Conference, Minot, N.D.
[http://www.npac.syr.edu/users/jravitz/Ravitz_Paper_8_95.html]

Riel, M. (1996). The Internet: A land to settle rather than an ocean to surf and a new 'place' for school reform through community development.
[http://www.gsn.org/teach/articles/netasplace.html]

——— (1996). The Internet and the humanities: The human side of networking. [http://www.ed.gov/Technology/Futures/riel.html]

——— (1993). Learning circles: Virtual communities for elementary and secondary schools. [http://www.ed.uiuc.edu/Guidelines/Riel-93.html]

Watt, D.L., Carter, R., Franklin, D., Haddad, N., & Pervane, Z. (1998). Choosing and evaluating groupware for Net-based collaboration.
[http://www.lab.brown.edu/ocsc/Tools.html]

Print

Grudin, J. (1994). Groupware and social dynamics: Eight challenges for developers. *Communications of the ACM 37* (1): 92-105.

Hunter, B. (1990). Computer-mediated communications support for teacher collaborations: Researching new contexts for both teaching and learning. *Educational Technology 30* (10): 46-49.

Koufman-Frederick, A. (1997). Electronic collaboration for professional development: Designing the learning environment. (Qualitative research report, proposal for Ph.D. dissertation, Boston College.)

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——— (1989). Four models of educational telecommunications: Connections to the future. *Education and Computing 5*: 261-274.

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Burton, W. SEEDS: CMC practice: Facilitating the online experience. University College of the Fraser Valley.
[http://malun1.mala.bc.ca/seeds/cmc/practice.html]

Guidelines for educational uses of networks. A collection of guides to planning networked projects, courses, etc. that is available from Learning Resources Server, University of Illinois.
[http://lrs.ed.uiuc.edu/Guidelines/]

Kimball, L. A variety of her writings on network based collaboration.
[http://www.tmn.com/-lisa/]

_____. Ten key elements to manage to make virtual teams more effective.
[http://www.tmn.com/-lisa/teams/ten.htm]

Resources for moderators and facilitators of online discussion. A Web site of resources for moderators of online discussions.
[http://star.ucc.nau.edu/-mauri/moderators.html]

Spitzer, W., Weddin, K., & DiMauro, V. Fostering reflective dialogue for teacher professional development.
[http://www.terc.edu/papers/labnet/Guide/Fostering_Refl_Dialogues.html]

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Information about LAB programs and services is available by contacting:

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Fax: 401-421-7650

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Fax: 617-349-8169

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About TEECH

About the National School Network

The National School Network (NSN) is a nationwide group of educators collaborating to advance educational reforms through internetworking at local, state and national levels. Funded from 1992 to 1998 by the National Science Foundation, the network was developed by BBN Technologies at GTE Internetworking, and operated by its Learning Systems & Technologies group. During the fall of 1998 the National School Network moved its home from BBN/GTE Internetworking to Boston College. To find out about the current status of the NSN contact Melanie Goldman or Beverly Hunter at Boston College (see contact information below).

NSN has over 500 participating community members, among them more than 250 schools and districts across the U.S. In addition, the total group includes museums, libraries, research institutions, small businesses, and corporations.

The NSN Web site includes the NSN library assembled from three years of NSF-funded research and practice. This includes papers, surveys, and the Exchange Desks—resources and know-how on networking, professional development, assessment and standards, and more.

Information about the National School Network is available by contacting:

The National School Network
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Learning Communities Research Group
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Chestnut Hill, MA 02467
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About TEECH - Teacher Enhancement Electronic Community Hall

TEECH was an electronic community set up to foster collaboration among leaders in teacher development. Housed at TERC, this project was funded by the National Science Foundation from 1995 to 1998. TEECH was available to principal investigators (PIs) of all teacher enhancement projects.

Information about the TEECH project is available by contacting:

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For Information on BBN's TEECH Projects In Profile contact:

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